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No. 1. JULY, 1896. Vol. VIII.

ADDRESS TO THE ROYAL GEOGRAPHICAL SOCIETY.

By SIR CLEMENTS MARKHAM, K.C.B., F.R.S., President.*

The great event of the year that has occurred since our last anniversary has been the coming of the International Geographical Congress to London. We gratefully acknowledge the generous assistance which came from public bodies and from patriotic individuals not otherwise connected with us; but the reception and organization of the Congress was our own work. This Society, through committees appointed by its Council, arranged all the details, it guaranteed the necessary expenditure, and two-thirds of the subscriptions came from ourselves. We have every reason to feel satisfied with the result. The total number of members of the Congress was 1552, of whom 950 were Fellows of the Royal Geographical Society. Forty different colonial and foreign governments were represented by 451 members, of whom 72 were appointed to represent thirty foreign governments, and 189 were appointed to represent seventy geographical societies and twenty other societies of kindred aims.

The work done by the Congress was of permanent value. The number of papers published in the Report is 82, some being reviews of work done, but most of them being original disquisitions. The most important papers of the former class were the admirable record of the work of the Great Trigonometrical Survey of India by our lamented colleague General Walker, and the accounts of the surveys of South Africa by Dr. Gill, the astronomer royal at Cape Town. But all branches of our science received attention, and the papers were nearly equally distributed among them, the largest number being on subjects relating to surveying and oceanography, and next coming those on the

* Delivered at the Anniversary Meeting, June 15, 1896.

physical geography of the land and on questions relating to Polar and to African exploration.

The Report of the Congress has just been published in the form of an octavo volume of 1100 pages, edited by our librarian, Dr. Mill. It includes an introduction giving an account of the origin of the International Geographical Congress, a diary of the proceedings, an account of the hospitality offered to the members, and an analysis of the membership. The body of the Report contains the papers read at the Congress, with the subsequent discussions.

My own impressions respecting the advantages to geographical science derivable from the meetings of the International Congress are very favourable, and I believe that my opinion is shared by others who have had experience of its work. Not only do these meetings afford occasions for taking stock of the advances that have been made in the various branches of our science, and of bringing forward new methods for discussion, and new projects for consideration, but they also give opportunities for the leading geographers of the world to meet together, to exchange ideas, and in many instances to form permanent friendships. Geographers of various nationalities thus become known to each other, misunderstandings are explained, points of agreement are emphasized, and personal acquaintance smooths away many difficulties, and ensures future cordial co-operation in the great work in which all geographers are interested.

Two very important measures were adopted at the last Congress which are well calculated to improve the organization and secure continuity for the labours of successive meetings. One was the arrangement by which an international committee of the forty Vice-Presidents was formed to consider various details of management, and to discuss the resolutions submitted by members before they are put to the vote at the final general meeting. The other was that the executive, including the President and Secretaries, should hold office until the meeting of the next Congress, thus giving a continuity to the work it did not previously possess. Sixteen resolutions were passed by the final general meeting, eight being simple expressions of opinion involving no farther action of the executive. But these deliberate expressions of opinion by the assembled geographers of the world may be confidently expected to carry some weight, and to influence the further discussion of the questions they deal with. The other resolutions will entail some work on the President and Secretaries of the Congress. Some of them involve the collection of information and opinions from the Geographical Societies of the World, with the duty of reporting the results to the next Congress. The subjects which are to be investigated in this way include the systematizing of geographical publications, the planning of a general bibliography of geography, the promotion of Professor Penck's idea of a map of the world on the scale of 1 : 1,000,000, the

orthography of place-names, and the feasibility of introducing a decimal division of angles and of time. It will be seen that the work undertaken for the Congress by the President and Secretaries by no means came to an end with the week of meeting, but that it will be continuous until the meeting at Berlin in 1899, when they will have to give an account of their stewardship.

One resolution of the Congress referred to the improvement of the position of geography in the education of this country. Efforts in this direction have been made by our Council for a quarter of a century. Readerships in geography at the two Universities of Oxford and Cambridge have been subsidized for ten years, and the time is now about to expire during which this help was to be given. We have not secured that full recognition of our science which is its due, and which it holds in the university courses of other countries. Still, there can be no doubt that our persevering advocacy has done good throughout the country. I hear, from time to time, of excellent geographical work being done in some of our secondary schools, notably at St. Olaves, Southwark, and at the Roan School at Greenwich; while the Society's prizes given to the nautical schools on board the *Worcester* and *Conway* have had a marked effect in improving the teaching of geography. I also have great pleasure in being able to announce that the University of Oxford has resolved to continue the geographical readership after the subsidy from our Society has been withdrawn; so that we have the satisfaction of knowing that our persevering efforts have been rewarded by a permanent advance in the right direction—so far, at least, as Oxford is concerned. I cannot doubt that, when the time is ripe, Cambridge will come to a similar resolution.

There can, however, be no hope that geography will obtain its proper place in the educational system of this country until efficient teachers have been trained, and have had time to make their influence felt in the secondary schools and in public examinations, as well as in the universities. I am informed of a very striking circumstance connected with one of our leading public schools. The fifth form was taught history, and the master illustrated his lesson with occasional geographical descriptions. One day the whole form came to him and asked to be taught geography. He could not comply, owing to the fact that geography was excluded from the curriculum, but he promised to get proper books and direct their reading. This shows that the great and urgent needs are the recognition of geography as a branch of knowledge to be included in the work of all secondary schools, and the supply of efficient teachers. It is in this direction, therefore, that our efforts should now be turned, and it is proposed that a London School of Geography should be formed, of university rank, which would, at the proper time, seek affiliation to the proposed teaching University of London. A detailed scheme, prepared by Mr. Mackinder, is now under the consideration of

our Council, and meanwhile a prospect is thus opened of gradually but surely founding a system of training and instruction through which the science, which of all others is the most important to the interests of this great empire, will receive due attention. Men will be supplied in sufficient numbers, who will have been trained to teach geography as it should be taught. It is hoped, also, that the students will not be confined to those who are about to enter the teaching profession.

It will be found that, in every calling, a man's efficiency is increased by becoming a sound geographer. The value of geography will eventually be understood and appreciated throughout the educated classes of the community; it will receive due attention in the secondary schools and in the examinations; and thus, through the machinery of the proposed School of Geography, the great aim and object of our Society will gradually but surely be secured.

I have, however, always considered the instruction of intending travellers to be the most important and the most successful part of our educational efforts. Instruction in surveying, mapping, and the fixing of positions by astronomical observations; in geology, botany, and photography, has been provided for some years. The Council has this year made the course more complete by adding three other subjects, namely, zoology, anthropological measurements, and instruction as to what and how to observe in the field, from the general geographical standpoint. Our explorers, if they can be persuaded to allow sufficient time to go through the course we offer to them, before proceeding on their expeditions, will be thoroughly qualified travellers, able to take a place in the front rank of scientific geographers, and thus to maintain and uphold the credit of their country. This has rarely been the case hitherto.

Our afternoon meetings, which were commenced last year, have been continued; and there was one of special interest, when Dr. Mill submitted a scheme for the geographical description of the British Islands, based on the Ordnance Survey. Taking the one-inch maps as a basis, his proposal is that a memoir should be prepared for each sheet, treating each subject from the geographical standpoint, and the memoirs being all on the same general plan. The great utility of such a series of memoirs will be clear to every geographer. There can be little doubt that the scheme will be appreciated by the general public; and, as Dr. Mill justly remarks, the generalization of geography, in the coming century, will find a multiplicity of applications in economic, political, and social life, which will be of the utmost national importance. There are abundant materials for such memoirs, and already there are numerous diligent workers at the various branches into which the subject will be divided, scattered over all parts of the British Isles. I think that it is the duty of a Society like ours to take the lead in a great imperial work of this kind, and a special committee of the Council is now giving

careful consideration to the plan on which it should be conducted, and to the feasibility of making a commencement.

Our labours connected with the library have been somewhat retarded by the heavy work entailed upon our staff by the recent meeting of the International Geographical Congress; still, good progress has been made. The authors catalogue was completed and published at the close of last session. The work of preparing cards and slips, with the titles of all our books, and of the articles in all the volumes of transactions and journals, for the subjects catalogue, has steadily advanced, until now upwards of 38,870 such titles have been written out. It remains to complete the classification of these cards, and the subjects catalogue will at once be available for reference in the library. Meanwhile, the copious bibliography published monthly in the *Journal* has been cut out, pasted on cards, and classified by Dr. Mill for four years, so that the subjects catalogue is actually complete for all accessions from the present month upwards to 1892. The question of printing must be postponed until the whole is collected on cards, cross-references supplied, and the entries classified. Probably two years will elapse before this is completed; but within six months the arrangement will be sufficiently advanced to make the catalogue a work of very great usefulness to all Fellows of the Society who are engaged in geographical study or research.

We are about to receive legacies under the wills of Mr. Jackson, formerly of the French Geographical Society, and of our gold medallist, Mr. Chandless, the South American explorer, who has been so good as to leave us £500. Mr. Chandless was one of the best travellers of the present century. He was the first to examine two great tributaries of the river Amazon, the Purus and the Aquiri, from their mouths to the end of navigation, and his work was not in the nature of a reconnaissance, but was an elaborate scientific survey. His loss is much to be deplored, for he would have admirably represented South America on our Council. Indeed, our losses have been exceptionally heavy during the last year. In Mr. Joseph Thomson the Society has to mourn the loss of a most enthusiastic and successful African traveller, whose highest merit was that his explorations never caused injury or death to a single native. Sir Thomas Wade, an eminent Chinese scholar, and Dr. Robert Brown, a distinguished naturalist and prolific writer, with special knowledge both of the northern regions and of Morocco, were most valuable members of our Council; and in our secretary, Mr. Seebohm, we have lost a most obliging and warm-hearted colleague, whose great knowledge of ornithology frequently illustrated and gave additional interest to our discussions. The most irretrievable loss we have sustained is caused by the death of General Walker, whose knowledge of geodesy and of surveying in all its branches, and whose intimate acquaintance with the geography of Central Asia, rendered his services to the Society indispensable. There is, however, one way by which we can do honour

to his memory: we can advocate and promote, by every means in our power, that survey of the northern slopes of the Himalayan system of mountains which he had at heart.

It is there that the largest unexplored Asiatic area is to be found. Some years ago I amplified the comparison between the ranges of the Himalayas and the Andes which was originally instituted by Warren Hastings, after having studied the works of La Condamine. But in truth the differences in the physical aspects of the two regions are as great as the resemblances. Whereas the western cordillera of the Andes is a maritime range sloping down to the shores of the Pacific, the northern Himalayan range buttresses that lofty plateau which forms, as General Walker has pointed out, the largest protuberance on the Earth's surface. The Chang, as the Tibetan portion of this lofty region is called, was unknown twenty-five years ago, but it has since been traversed both from east to west, and from north to south, most recently by our gold medallist, Mr. St. George Littledale, who crossed the northern Kuen-Lun range and reached the plateau a year ago. In the interval between the journey of Pundit Krishna in 1872 and that of Mr. Littledale, the plateau has been traversed several times. Pundit Krishna, advancing northwards from the valley of the Tsanpu, crossed the northern range of the Himalayas and reached the plateau by the pass called Khalamba-la, 17,200 feet above the sea. He discovered and made a survey of Lake Tengri-nor, and described the grand range of mountains to the south-east of it.

It is to the desirability of completing the exploration of this mighty range, that I am anxious to turn the attention of geographers. But first it will be well to contemplate the aspects of the great plateau to which it forms a southern buttress, and to review briefly the knowledge that has been acquired of it since the journey of Pundit Krishna, which culminates with the narrative of Mr. Littledale's great achievement.

In 1874, Nain Sing reached the plateau from its eastern side. He too, in traversing the elevated plains, traced the line of snowy peaks to the south for 180 miles, and found that one of the peaks, called Targot-yap, was 25,000 feet above the sea. Coming from the west, he crossed the plateau to Lake Tengri-nor, and descended to Lhasa, after having traversed 1200 miles of previously unknown country. In 1891, Major Bower also crossed the great plateau from west to east, taking a more northern route than that of Nain Sing. It was traversed from north to south by Prince Henry of Orleans and M. Bonvalot on the east side, and by Mr. Littledale, who advanced across its centre; while several travellers have visited the eastern side, where the great Chinese and Burmese rivers take their rise. Pundit Krishna left Lhasa in 1879, and examined this eastern boundary of the plateau, crossing the region twice, from Lhasa to Chaidan, and from Chaidan to Darchendo. Mr. Rockhill, in 1892, coming from the north, penetrated as far as the Namon pasture lands; and Prjevalsky also advanced for some distance into the great Chang.

From the narratives of these intrepid travellers we gather information respecting the elevated Tibetan plateau, which, however, is only the eastern portion of a far more extensive mass. The Pamirs, the plateau north of the Mustagh range, and the Tibetan Chang together form a mass extending over 30 degrees of longitude, which General Walker calculated to be 1700 miles long and 300 miles broad, with an area of 500,000 square miles, and an average height of 14,000 feet. The Chang or Tibetan portion, consisting chiefly of rounded hills and intervening valleys, has no defined watershed, the rivers flowing in various directions and terminating in large salt lakes, which are from 15,000 to 17,000 feet above the sea. Not a single tree is to be seen over this vast expanse, but the rain and snowfall is heavy, and Major Bower says that nourishing grass springs up during the short summer, which maintains large numbers of yak and antelope. Nain Sing, whose route was to the south of that of Bower, found willows and tamarisks round the Thachup lake, at a height of 15,000 feet, and even a few fields of barley, and villages on the plain of Ombo, 15,200 feet above the sea. To the eastward the character of the scenery changes. The rounded undulating bare hills are succeeded by well-wooded mountains, there are rapid rivers in the deeply cut valleys, while the yak and antelope give place to deer and pheasants.

Although several intrepid travellers have crossed the Chang in various directions, a vast area still remains unknown, especially towards the north-west. But I think it is to the mountains which form its southern buttressing wall, and which rise from the valley of the Tsanpu or Brahmaputra, that the efforts of explorers should now be directed. The western portion of the northern Himalayan range is known as the Karakorum, separating the valley of the Indus from that of the Yarkand. Its glaciers were surveyed by Colonel Godwin Austen, and have since been visited by Sir Martin Conway. One of its peaks, appropriately named Mount Godwin Austen, attains a height of 28,000 feet; while its passes, such as Karakorum and Chang-chenmo, are the loftiest in the world. The Tibetan continuation of the Karakorum, which is still almost unknown, commences at the famous central peak or knot called Kailas by the Hindus, and Gangri by the Tibetans, which is 22,000 feet above the sea. Continuing in an easterly direction, it forms the northern watershed of the Tsanpu or Brahmaputra. It appears to be a magnificent range of mountains. Pundit Krishna reported one of its peaks to be at least 25,000 feet above the sea, and the Khalamba-la pass 17,200 feet high. The name given to it by Mr. Brian Hodgson is Nyenchhen-tang-la, and the same name is referred by Pundit Krishna to one of its peaks. The only traveller who has crossed the range is Pundit Krishna, when he traversed the Khalamba-la (17,200 feet); but Mr. Littledale reached the Goring-la (19,587 feet), which is more to the east. He speaks of the magnificent range of the Ninchen-Tangla, as a succession of snow-clad peaks and glaciers, partially hidden in clouds and vapour, which added

to their size and grandeur, while above all towered, with cliffs of appalling steepness, the great peak of Charimaru, 24,153 feet high. Mr. Littledale describes this peak as one of the most impressive mountains he had ever seen, from one point of view appearing as a needle-shaped rock piercing the sky, and from another as a sharp ridge, having a peak at either end. This I believe to be the whole of the knowledge we now possess of this most interesting range of mountains. Commencing at the knot of Kailas, it forms the northern boundary of the Tsanpu valley to about the 90th meridian, and then turns north-east, so as to become the eastern boundary of the Chang, while on its eastern slopes are the headwaters of the three great rivers of Salwin, Mekong, and Yang-tsze.

The portion of this northern Himalayan chain from Kailas to the Goring-la of Littledale, a distance of 600 miles, requires to be explored. It has once been crossed by the Khalamba pass, and a second pass was reached, but not crossed by Mr. Littledale. The Pundit Nain Sing traced the line of its peaks for 180 miles from a great distance, and Mr. Littledale gazed with admiration on the beautiful outline of a snowy ridge which shot up into the sky to a height of 24,153 feet, to the east of the Goring-la—the peak of Charimaru. This is the sum of our knowledge respecting this range of lofty mountains, which is alike the northern range of the Himalayan system and the southern buttressing range of the great Chang or Tibetan plateau, as the Kuen-lun is the northern buttressing range. A more accurate knowledge of its configuration is a great geographical desideratum. Its peaks along the hundreds of miles of its extent should be measured, its passes should be explored, the nature and extent of its glaciers ascertained, as well as its geological formation, and its relation to the great interior plateau. Here, then, is a piece of work which is well calculated to arouse the ambition of future explorers. Captain Deasy, with his companion, Mr. Pike, is now starting on his contemplated journey in this direction; and I am sure that any other young explorers who resolve to undertake this achievement, will receive the cordial assistance of our Council.

Running in a north-westerly direction from the Charimaru peak, the south-eastern scarp of Tibet, with the meridional chains which branch from it, offers an equally important field of work to the explorer. Through these meridional chains, which together only have a width of 150 miles, flow three great rivers, whose courses have not yet been completely brought to our knowledge. These are the Dichu, the Chiamdo-chu, and the Giama or Nu-chu, which are known in their lower courses as the Yang-tsze, the Mekong, and the Salwin. In 1879 Pundit Krishna crossed the upper waters of these rivers and the intervening parallel ranges, at points where the latter were from 8000 to 12,000 feet above the sea; and they were traversed in 1892 by Major Bower. The Abbé Desgodins frequently traversed the Lu-tu-kiang river, which he believed to be the Salwin, and had a station near the banks for more than a year.

Lastly, Prince Henri d'Orleans, to whose interesting narrative we had the pleasure of listening on the 18th of last month, crossed the rivers in a daring and important journey from China to Assam, and established the correctness of Desgodin's conclusion, while ascertaining that the Irawadi rose in mountains within sight of his route, thus having a course some 600 miles shorter than those of the three rivers, Salwin, Mekong, and Yang-tsze. His Highness accounted for the volume of the Irawadi being greater than that of the Salwin by the fact that the former receives tributaries traversing a wide area, while the latter, though its course is much longer, flows through a deep ravine with ridges on either side, having a very limited drainage area.

The difficulty of travelling in this region of the rivers is very great. Prince Henry had to cross thirteen chains of mountains in two months, and there are savage tribes, such as the Mishmis, to be encountered. These are obstacles to be overcome, and give zest to an expedition. Many are the willing volunteers who would eagerly come forward to complete the discovery of the courses of these rivers, and to delineate more exactly the range where the main tributaries of the Irawadi take their rise. These are undertakings of the greatest geographical and commercial importance, and, together with the survey of the northern Himalayan chain, they should be zealously and persistently promoted and supported until the work is done. There are many unknown parts of the world, and it will be long before their exploration is completed and all is made clear to us; but few offer greater credit to the traveller, and more extension to geographical knowledge, than the solution of these Asiatic problems, to which I should add the completion of the discovery of the unknown portion of the course of the Brahmaputra.

We have had two very important communications this year relating to the geography of the African continent, one of which considerably increased our knowledge of the region between Somali-land and Lake Rudolf. Although Dr. Donaldson Smith encountered many difficulties, and was much harassed and delayed by native opposition, he succeeded in the main object of his expedition and brought back much valuable information, which was alike new and suggestive. The region from the most western point reached by Dr. Donaldson Smith to the Nile, and extending northwards to the Abyssinian province of Godjam, is very little known, and I pointed out in my opening address in 1893 that this was the most interesting portion of the African continent which remained to be explored. It includes Enarea and Kaffa, the latter district being of sufficient elevation above the level of the sea to yield good crops of coffee. The papers by Mr. Robinson and Mr. Wallace on Hausaland were of special interest owing to the excellent progress made by the Royal Niger Company, and to the valuable results that are likely to be derived from Mr. Robinson's study of the Hausa language. I am glad also to announce that Captain Vandeleur has returned from Uganda

with very interesting geographical information as the result of his travels.

There is one branch of our science which, more than any other, connects it with historical research. I allude to the effects which the operations of mankind have had on the physical geography of many regions. These effects have often been mischievous and deleterious, as, for example, where forests have been destroyed on the west coast of Spain, in Italy and Sicily, and in other parts. But they have generally been beneficial. The drainage of swamps has improved the climate and increased the productive powers of the soil. Irrigation works in dry and hot countries have had an equally beneficial effect. I make special allusion to the action of man on nature, because last year a great work was completed which will have the effect of altering the physical aspect of an extensive region. I allude to the completion of the Periyar project in the Madras Presidency.

The range of mountains extending down the peninsula of India to Cape Comorin, called the Western Ghâts, is covered with forests, and two of its peaks reach an altitude of over 8000 feet. The country on the west side is superabundantly supplied with water by the south-west monsoon; while to the eastward the tanks catch the scanty rainfall, —and often there is scarcity of water, sometimes causing famine. In the far south the river Periyar has its sources in a mountainous country, covered with dense forest, which is almost unexplored. The river flows northward between the ridges of the mountains, receiving tributaries, and seeking an outlet to the sea. At length it breaks through the rocky barriers and reaches the coast, but on the western side where water is not wanted, instead of on the east side where it is so scarce and so urgently needed.

The districts of Madura and Ramnad were dependent on their tanks being filled with rain-water for the very existence of the people; while this great volume of the priceless fluid was being wasted in the Travancore backwaters. Here, then, is an instance of the possibility of a geographical mistake being corrected by the intelligence and energy of man. More than a century ago the native minister of the Ramnad principality had proposed that an attempt should be made to cut a trench by which the Periyar should be forced to give up some of its waters to the thirsty plains of Madura. But the difficulties were very great. It would be necessary to make a tunnel through the mountain ridge which forms the water-parting, and the forest region in which the work must be carried on is frightfully unhealthy. Still, the enormous benefit to a large population was obvious, and several detailed proposals were submitted by collectors and district engineers. Many years ago I myself crossed the mountain range from Travancore to Madura, and, after going over the ground, I sent in a report urgently representing the propriety of including the Periyar project among the irrigation schemes that should be promptly undertaken.

Year after year passed away. At length the project was sanctioned, and, thanks to the ability and perseverance of Captain Pennycuick, the engineer in charge of the works, the needful dams were built, the tunnel was excavated, and last year the life-giving waters of the Periyar were turned over from the western to the eastern side of the peninsula. Lord Wenlock, the late governor of Madras, had the satisfaction of terminating the period of his rule by inaugurating this great and beneficent work, with Captain Pennycuick, who had borne the heat and burden of the day, standing by his Excellency's side to receive that praise which was his due.

I have thought it right to give a place in my address to the Periyar project on the occasion of its completion, because it is the most striking example, within my knowledge, of the power of man to alter permanently the physical geography of a region. Madura was an arid plain, constantly parched for want of water. Henceforward it will be effectually irrigated, and its whole character will be altered. We may see, in many parts of the world, the alterations in climate and in the physical conditions of a country which may, in the course of time, be caused by the reckless or ill-conceived operations of its occupants; but here we are shown how, by careful calculations and engineering skill of a high order, backed by administrative sympathy and foresight, a geographical change may be wrought which will be productive of good to a large community. Those who opened the sluice gate and let forth the beneficent flood, are benefactors to the human race; and I am happy to be able to announce that both Lord Wenlock and Captain Pennycuick are to be our guests this evening.

Before entering upon the concluding part of my address, in which I propose to refer to polar efforts and to our absent friends in the far North, I must touch briefly on the plans which were explained to us last February by Professor Milne, for the establishment of observatories for recording earthquakes and other movements of the Earth's crust in various parts of the world. In this country I feel little doubt that Professor Milne will obtain sufficient aid to establish a suitably equipped seismic observatory, and he will find sympathetic co-operation in Europe and the United States. It is desirable, also, that such an observatory should be established in South America, and another somewhere in Mexico. I am informed that the present President of Mexico is likely to take an interest in the proposal, and I have, therefore, addressed a letter to Señor Romero, the Mexican Minister in London, on the subject. When these proposed observatories are at work in sufficient numbers and at suitable distances, there can be no doubt that their simultaneous observations will result in a great increase of our knowledge respecting seismic phenomena. I am sure that our Council will be desirous of co-operating with Professor Milne, for by fostering and promoting his plans we shall be helping to advance a most interesting investigation,

which forms a part of the great body of knowledge which is included in the science of geography.

No less than four Arctic expeditions are now actually at work; while the one which has long made all geographers turn eagerly for news to the head of Baffin's Bay has returned. It will be conceded that Lieut. Peary's most remarkable journey over the Greenland ice represents the finest and the most important piece of glacial work that has ever been performed.

Our thoughts have been much with the gallant little *Fram* during the last few months, and there has been anxiety owing to the report which came from Siberia, and which has since been found to be without any foundation. I only partly share that anxiety. Nansen is not a man to turn back until he has either achieved his glorious enterprise, or has done all, and more than all, that seems possible with the means at his disposal. He should not be at the end of his resources. Before that time arrives he will secure the safety of his people by timely retreat. For he is not fool-hardy. His lofty enthusiasm is tempered with forethought and prudence, as is the case with all great leaders of men. We may, therefore, hear of him this summer; but I shall not be surprised if we do not, nor should there be any great anxiety until next spring. Meanwhile I trust that Cape Chelyuskin and the New Siberia islands will be visited this summer, on the chance of obtaining tidings. No fitter man could be found for that duty than our associate Captain Wiggins, the indefatigable navigator of the Kara Sea.

Mr. Montefiore furnished us, last November, with a very encouraging and a very satisfactory account of the progress of the Jackson-Harmsworth expedition. The only misfortune was that the *Windward* was unable to return in the autumn, and was obliged to winter at Franz Josef Land. But the little Arctic settlement had been formed; a winter had been successfully passed; the equipments had been tried; the explorers were in good health; and Mr. Jackson had not only commenced his sledge-travelling, but had made some interesting discoveries. Our gallant friends had become acclimatized, and were imping their wings for a more glorious flight this spring. Mr. Harmsworth's munificent support of geographical exploration has been well rewarded already, and he has every reason to be satisfied with the result so far. On the return of the *Windward* next autumn, we may confidently expect to receive tidings of very important discoveries in the direction of the pole. There never has been a private Arctic expedition despatched from these shores on so complete a scale, nor has there been one on which such anxious care has been lavished in every department of the work. The narrative of Mr. Montefiore convinced us that it was ably commanded, and that the leader was well and zealously supported. We may, therefore, anticipate that all will be done that gallant and well-trained men can do. We hope that they will command success. We are certain that they

will deserve it. May God speed them in their glorious efforts during the coming season.

Great interest has been taken in the exceptionally daring and original undertaking of M. Andrée to cross the north pole in a balloon, with two companions. When we listened to the most interesting account he gave of his plan at the Congress, and to his ready and pertinent replies to all objections, we felt that, if the thing could be done, M. Andrée was the man to do it. I believe that all his preparations have been made. The Swedish minister in London has made excellent arrangements for supplying information respecting the balloon to all the circumpolar tribes and settlers. M. Andrée will start from Spitzbergen this month, and he will take with him the hearty good wishes of all geographers. It is not likely to be many weeks before we hear of this most remarkable enterprise having been completed.

The coasts of the Spitzbergen archipelago are now well known, with the exception of some of the outlying islands to the eastward, where the sea is generally blocked with ice. As one who has enjoyed several delightful cruises in the Training Squadron, both in northern and in tropical seas, I rejoiced to hear that the four ships of which it is composed visited Spitzbergen last year, and that the officers did useful work in making a survey of Recherche bay. An interesting account of the visit of the Training Squadron to Spitzbergen, by Commander Coke and Lieut. Rolleston, of H.M.S. *Active*, was published in our *Journal*. As regards the interior, Baron Nordenskiöld has traversed the North-East island. But the interior of the main island has never been explored. It occurred to our associate, Sir Martin Conway, after his return from the glaciers of the Karakorum, that here was a field where good and useful geographical work might be done. With characteristic energy, he made himself a complete master of Spitzbergen literature from the earliest times, consulted all available authorities, and was confirmed in his first impression. He therefore made up his mind to undertake the task of exploration this summer. Parts of the interior of Spitzbergen are known to be covered with glacier, but naked peaks and ridges have been sighted from the coast, and there is reason for the belief that valleys and plains will be found, which are not filled up with glacial ice. In that case the interior will be of great interest, not only to geographers, but also to geologists and naturalists. Sir Martin Conway's expedition will be conveyed to Ice Fjord, whence the explorers will push inland in a northerly direction. Sir Martin has five companions: Mr. Trevor Battye, who gave us such an entertaining monograph on Kolguev island, is the naturalist; Mr. Gregory, the African traveller, and Mr. Garwood, are the geologists; and a young cousin of Sir Martin Conway goes as artist; while Mr. Studley accompanies the expedition as sportsman. They are all young and enthusiastic men. Some have experience already; others have to win their

spurs. They are sure to do their best, and they go forth with the hearty good wishes of their brother geographers.

Of the Arctic Regions there is a good report to make, but our strenuous efforts to secure the exploration of the southern polar regions have not as yet been successful. In 1893, Mr. Larsen, a Norwegian captain, did some excellent work to the south of the South Shetland islands. Last year the Norwegian whaler *Antarctic*, sailing from Melbourne, penetrated through the pack, and, for the first time since 1842, the Victoria Land of Sir James Ross was sighted. Two landings were effected, the first on one of the Possession islands, the second on the mainland near Cape Adare. Mr. Borchgrevink, a young and enthusiastic Norwegian, served on board the *Antarctic*, and, returning to Europe, he gave us an animated narrative of the voyage at one of the meetings of the Congress. He has since shown great zeal for the renewal of Antarctic work, and I rejoice to hear that there will be an English Antarctic whaling venture this year, and that Mr. Borchgrevink has succeeded in making an arrangement by which he will be landed at Cape Adare, with a few chosen companions, and pass the winter on the Antarctic continent. He contemplates the exploration of part of the interior on *ski*, or Norwegian snow-shoes, and the whaler will return for the explorers in the following summer. This is a most praiseworthy undertaking, not without risk, but with the promise of useful results, and, in the name of my geographical associates, I heartily wish Mr. Borchgrevink all the success that his scientific ardour can anticipate, and a safe return.

The great desire of scientific men throughout the world, as well as of all patriotic Britons, is that a Government Antarctic expedition should be equipped for the complete attainment of all those valuable results which are so urgently needed, more particularly as regards a magnetic survey, and which can only be effectually secured by an expedition under naval discipline. The decision of our Government to follow the numerous glorious precedents of the past, would be quite as advantageous to the navy as to science. All the scientific societies of Great Britain and of Australia expressed their cordial concurrence in the importance of despatching an Antarctic expedition, and their willingness to appoint delegates to form a deputation for the purpose of representing the numerous results to be obtained. I therefore wrote to the First Lord of the Admiralty to request him to receive a deputation, at the same time referring to the facts that he was in office when the *Challenger* was commissioned, and that the work of an Antarctic expedition was a complement to that of the scientific expedition which he had himself inaugurated.

Mr. Goschen replied that, owing to the outlook abroad, every shilling that could be obtained from Parliament, and every man that could be made available, would be urgently needed for our fighting fleets, and as his answer could not then be favourable, he did not wish to take up

the time of the proposed deputation. But we do not look upon this reply as altogether discouraging as regards the future. He expressed his full appreciation of the great importance of the results of Antarctic discovery. The threatening political clouds which were gathering when the year opened may disperse. There can be no doubt of the great professional advantages derived by naval officers and men who are employed on difficult services. It may dawn upon the authorities that the building of ships is not more important than the training of those who fight them; and in that case we have the high authority of Admiral of the Fleet, Sir E. Commerell, and of many others whose opinions cannot be ignored, that polar service is the best nursery that can be supplied for naval men. Meanwhile the great importance of the scientific results of an Antarctic expedition continues to increase. Under the above circumstances, there is full justification for a renewal of the application that was made last year; and I believe that there is reason to hope that the influences which were adverse will be weaker, and that the arguments in favour of following the great precedents of former days will have more force.

A review of our progress during the year that is past is, on the whole, satisfactory. The Congress was a great success. Excellent work has been done in Asia, in Africa, and in the Polar Regions. Above all, there is evidence of a great revival of geographical interest in the rising generation. Volunteers for all kinds of enterprises are numerous, zealous, and of the best sort. This is a good sign, and is of excellent augury. It betokens a future for the Society of continued activity and usefulness.

Admiral Wharton has kindly provided me with the report which follows on the Admiralty Surveys during the year (p. 44).

THE PAMIRS AND THE SOURCE OF THE OXUS.*

By the Right Hon. GEORGE N. CURZON, M.P.

THERE is a passage in a now too-little-read book by a famous author that depicts the very curiosity whereby I was led in the autumn of 1894 to make the geographical researches which this paper will attempt to record. In his 'Anatomy of Melancholy,' the ingenious Burton, summarizing the problems of natural history or physical geography which he would fain have solved, speaks thus: "I would examine the Caspian Sea, and see where and how it exonerates itself after it hath taken in Volga, Iaxares, Oxus, and those great rivers. I would find out with Trajan the fountains of Danubius, of Ganges, and of Oxus." To myself also the Oxus, that great parent stream of humanity, which has equally impressed the imagination of Greek and Arab, of Chinese and Tartar, and which, from a period over three thousand years ago, has successively figured in the literature of the Sanskrit Puranas, the Alexandrian

* Paper read at the Royal Geographical Society, February 18, 1895. Map, p. 96.

historians, and the Arab geographers, had always similarly appealed. Descending from the hidden "Roof of the World," its waters tell of forgotten peoples, and whisper secrets of unknown lands. They are believed to have rocked the cradle of our race. Long the legendary water-mark between Iran and Turan, they have furrowed a deep channel in the destinies and character of mankind. Already in 1888 I had crossed the Oxus in its middle course at Charjui, in the now Russianized territories of Bokhara. There, in the beautiful words of our English poet, I had beheld how—

> "The majestic river floated on
> Out of the mist and hum of that low land,
> Into the frosty starlight, and there moved
> Rejoicing through the hushed Chorasmian waste
> Under the solitary moon."

But the Oxus then before me was the Oxus of the plains only; it was—

> "Oxus forgetting the bright speed he had
> In his high mountain-cradle of Pamere."

And, with the poet, my imagination had flown eastwards and upwards to that aërial source, and had longed to pierce the secrets that were hidden behind the glaciers of the Pamirs and the snowy sentinels of the Hindu Kush. Where did this great river really rise? Which among the several confluents of its upper course was the true parent stream? This was a question that had been obscured by the imperfect information or the erroneous hypotheses of previous travellers, as well as complicated by the diplomatic sophistries of rival statesmen. At least four separate and mutually destructive claims had been made to the honour of parentage. It was in the main, so far as geography is concerned, in order to solve these doubts, and at the same time to see from personal observation those much debated lands of the Pamir or Pamirs, which have been variously represented as grassy plains and horrible wildernesses, as a certain death-trap for invading armies, and yet as the vulnerable gates of Hindustan, that I planned the journey which I now proceed to sketch. In dealing with it, I shall pass lightly over all other portions but those relating to the Upper Oxus valley and the Pamirs, in connection with which it is my desire in this paper to supply, so far as possible, a monograph of existing, though for the most part unpublished, information about the regions within or contiguous to that area.

During the six months of my absence in the autumn and winter of 1894, I really undertook two distinct journeys, which had little but a common political interest to unite them. The first was to the Indian frontier states of the Hindu Kush, the Pamirs, and the Oxus. The second was to Afghanistan. The distance covered on horseback or on foot in the two was just short of 1800 miles, much of it over ground of great difficulty. The fact that, while on the Indian frontier and

the Pamirs, I accomplished a daily average march of over 21 miles for fifty-four marching days, excluding halts, is no criterion of ordinary opportunities, since it was due solely to the exceptional kindness shown me by every British officer on the frontier, notably Captain Younghusband, a former Gold Medallist of this Society, as well as to the arrangements made in advance for my transport by the local chiefs and rajahs, notably by the Thum of Hunza, through whose territories I passed.

Similarly in Afghanistan, my daily marching average, with a large camp and an escort of over seventy men, was 27 miles. But this again was owing to the generous entertainment of the Amir, who laid out horses for me along the route. I make this explanation in order, on the one hand, to account for the apparent rapidity of a journey which, under ordinary conditions, would occupy probably nearly double the time, and, on the other hand, to disavow a credit to which I am not in the least entitled.

The first section of my journey was as follows. Leaving Srinagar, I marched up the military road that has been built since 1890 to connect the valley of Kashmir with the British military outpost of Gilgit. This road is a little short of 200 miles in length, and crosses the Himalayas by one of two passes—the Burzil, which is 13,450 feet in height, and the Kamri, which is 300 feet lower. Of this part of the journey, however, since it is well described both in Mr. Knight's and Mr. Conway's books, I shall here say nothing. From Gilgit I followed the Hunza-Nagar valley to Baltit, the capital of Hunza; and from there, in the middle of September, my friend Mr. Lennard, a noted *shikari*, who in 1891 had shot *Ovis Poli* on the Taghdumbash Pamir, and I started forth, escorted by the Thum and his Wazir and a crowd of Hunza men, for the Kilik Pass, by which we passed from Anglo-Indian territory to the Chinese possession of the Taghdumbash Pamir. There we stayed a few days to shoot *Ovis Poli*, and then made our way across the eastern watershed of the Pamirs by the Wakh-jir Pass to the headwaters of the Oxus and the Pamir-i-Wakhan. From there I paid a visit to Lake Chakmak and the Little Pamir. For some mysterious reason, the Indian Government was averse to my going on to the Victoria Lake and the Great Pamir. Accordingly from here I retraced my steps, and Lennard and myself marched down the Oxus valley to Sarhad, the frontier outpost of Afghan arms in Wakhan. From there we recrossed the Hindu Kush by the low depression known as the Baroghil Pass, beyond which we separated—Lennard to return over the Darkot Pass, with its formidable snow and glaciers, to Yasin and Gilgit; I to follow down the gorge of the Yarkhun river (which in its later course is variously known as the Mastuj, Chitral, Kashkar, and Kunar river) to Mastuj. There I was joined by Captain Younghusband, Political Officer in Chitral, who accompanied me for a further distance of 65 miles down

the same valley to the capital of that state, where we were hospitably entertained and treated with the greatest distinction by Nizam-ul-Mulk, the Mehtar or ruler, since treacherously murdered. From Chitral, finding it impossible to make, as I had hoped to do, the then untravelled but most important march to Peshawur, a distance only of 180 miles, or to Jellalabad, a distance of 160 miles, I was compelled to retrace my steps; and Captain Younghusband and I marched back to Mastuj, and from there, by the Chamarkand pass, Ghizar, Gupis, and Punial, along the valley of the Ghizar and Gilgit river, back to Gilgit. From Gilgit I followed down the Indus to the interesting post of Chilas, one of several small highland communities, of Aryan origin, inhabiting the mountainous and almost unexplored country called by themselves Shinkai. In 1892 Chilas passed into British hands, and is now the outpost of British arms among the frontier republics of the Indus valley. After leaving Chilas, I recrossed the Himalayas by the Babusar pass, 13,400 feet, and re-entered British Indian territory, descending to Abbottabad by the as yet little-known Khagan valley, which is the most direct route from Gilgit to any Indian military base. This was the termination of the first part of my journey.

When, a little later, I started for Afghanistan at the invitation of the Amir, I marched up by the ordinary road from Peshawur through the Khyber pass to Jellalabad and Kabul, a distance of 180 miles. This time I was alone. After a fortnight in Kabul, the Amir gave me permission to leave his country by way of Kandahar; and accordingly I marched down by the well-known route, 325 miles in length, passing through Ghuzni and Kelat-i-Ghilzai to Kandahar, that was last traversed by the armies of Sir Donald Stewart and Lord Roberts in 1880. From Kandahar I rode 65 miles to Chaman, the British frontier outpost in Beluchistan, where I again touched a railway and civilization. I shall say nothing of my journey in Afghanistan here, since its main features were of political rather than geographical interest; but shall revert at once to my earlier experiences, both in approaching and, still more, after crossing the Hindu Kush.

Upon the stupendous natural features of the region embraced by the Himalayan and Hindu Kush ranges, comment has more than once been made in papers read before this Society. Here a labyrinth of the highest peaks in the world lift their unscaled pinnacles above the deepest valleys, the most sombre ravines. Within a range of 70 miles, there are eight crests with an elevation of over 24,000 feet, while the little state of Hunza alone is said to contain more peaks of over 20,000 feet than there are over 10,000 feet in the entire Alps. The longest glaciers in the globe outside of the Arctic circle pour their frozen cataracts down the riven and tortured hollows of the mountains. Great rivers foam and thunder in flood-time along the resounding gorges, though sometimes reduced in winter—the season of low waters—to errant threads.

THE HUNZA VALLEY AND RAKAPUSHI.

Avalanches of snow, and—still more remarkable—of mud, come plunging down the long slopes, and distort the face of nature as though by some lamentable disease. In this great workshop of primæval forces, wherever the imprisoned energies are not still at work, they have left their indelible traces in the stormy outline of the crags, in the water-marks of lakes that have burst their bounds and have fled, in the artificial structure of the alluvial terraces, in the deep scouring of the impetuous streams.

There is, further, a certain gradation of landscape-impression, in the northward march from Kashmir to the Pamirs, that is not without an instructive as well as an æsthetic significance. On the earlier parts of the road to Gilgit, the traveller rides through the shade of pine forests and skirts romantic glens. Soon he passes into a region where there are neither trees nor flowers, where the mountains exhibit only a sterile and forbidding gradient, and where across the bald summits of the passes the snow-laden gales shriek a sentence of death to animal and man. The Indus valley, with its brown and verdureless rocks, enclosing the Tartarean trough in which the inky volume of the great river rolls by, accentuates the mournful impression. Then in the Hunza valley, which is undoubtedly one of the most remarkable scenes in the world, Nature seems to exert her supremest energy, and in one chord to exhaust almost every note in her vast and majestic diapason of sound. She shows herself in the same moment tender and savage, radiant and appalling, the relentless spirit that hovers above the ice-towers, and the gentle patroness of the field and orchard, the tutelary deity of the haunts of men.

Never can I forget the abruptness and splendour of the surprise when, shortly after leaving the fort of Chalt, 30 miles beyond Gilgit, there burst upon our view the lordly apparition of the great mountain Rakapushi, lifting, above the boulder-strewn or forest-clad declivities of his lower stature, 18,000 feet of unsullied ice and snow to a total height of 25,550 feet above the sea. I shall always say that next to the sight of Kinchinjunga from beyond Darjiling, this is the finest mountain spectacle that I have seen. Rakapushi is one of the most superbly modelled of mountains. Everywhere visible, as we ascend the valley, he keeps watch and ward over the lower summits, and over the smiling belts of green and orchard-plots below that owe their existence to his glacial bounty. But up above his true and imperial majesty is best revealed. There enormous and shining glaciers fill the hollows of his sides, and only upon the needle point of his highest crest is the snow unable to settle. As we gaze at Rakapushi, indeed, we find an unconscious answer to the poet's query—

> "What pleasure lives in height (the shepherd sang)—
> In height and cold, the splendour of the hills?"

For there, in more than fancy, we can—

> "Walk
> "With Death and Morning on the silver horns;"

There before us are—

"The firths of ice
That huddling slant in furrow-cloven falls
To roll the torrent out of dusky doors."

And though our eye, aching with the dazzling vision, may seek a transient solace in the restful verdure of the lower and terraced slopes, and may even dip into the deep gorge where the river hums 1000 feet below our feet, yet it cannot for long resist the enchantment of those glimmering peaks, and ever hankers for the fascination of the summit.

The distance from Gilgit to Hunza is 61 miles, which we covered easily in three days. In former times, and up till the brilliant little campaign in the winter of 1891, by which the British became the practical masters of the country, the road, if it could be so called without a grim jest, consisted in many parts of rocky and ladder-like tracks up the mountain-sides, and of narrow galleries, built out with timbers, round the edges of the cliffs. It has since been much improved by the sappers attached to the Gilgit garrison. Outside Baltit, the capital of Hunza, we were met by the Thum, or Mir, or Rajah, as he is variously called, Mohammed Nazim Khan, a young man of about twenty-eight years of age, whom the Indian Government invested with the ruling title after his elder brother, Safdar Ali Khan, a murderer and fratricide of more than ordinary activity, had fled before the British advance in 1891. The Thum was accompanied by his Wazir, Humaiun Beg, the representative of a family in which that dignity has been hereditary for generations, and himself the most agreeable and capable personality in the Hindu Kush states. I visited the Thum in the so-called castle of Baltit, a most picturesque edifice—the model of a feudal baron's stronghold—that rises to a considerable height above the flat-roofed cubes of the town. I was received in a chamber opening on to the roof, where the Russian explorer, Captain Grombchevski, had opened negotiations with Safdar Ali Khan in 1888. To this apartment it was necessary to ascend by a rude ladder, conducting to a hatchway in the floor. This might be thought a primitive mood of entrance; but then the castle of Baltit (so called because it was originally built by Baltis, from Baltistan) is not precisely a Windsor.

At Baltit, as also at Gilgit and at Chitral, I witnessed the native game of polo, which, after being introduced into India by its Mussulman conquerors nine hundred years ago, and having been the favourite game of the Mogul Emperors, found a refuge in these two out-of-the-way corners of the Hindu Kush states on the one hand, and Manipur on the other, until about thirty years ago it was brought back to its former haunts by the British officer. The Nagar men are reputed to be the best players in the Hindu Kush area; but the Kanjutis (the name by which the Hunza people are described north of the Hindu Kush) are little inferior. The game, as most people know, is played on a narrow strip of ground, frequently destitute of grass, surrounded by a low wall of

stones upon which the spectators take their seats, and from which the ball rebounds into play. The ground at Hunza is about 280 yards in length by 30 in width; but that at Chitral is wider, and has a curious bay or projection at one side. The goals are low white stones fixed in the ground, and at Hunza were only about 7 feet apart. The local band, consisting of a big drum, a couple of kettledrums, and two or three clarionets with a note very much like a bagpipe, accompany the performance, and when a goal is scored indulge in the most frantic din. The players, who range in number from four to twelve or more a-side, ride the native ponies, with the roughest of bits, on the highest of saddles, and use a much shorter polo-stick than is common in England, an almond-wood handle being rudely fitted into a heavy plane or willow-wood head. The native ball is of wood and is also very heavy; but the British officers, who habitually join the natives in the game, have among other reforms introduced the lighter English ball of bamboo-root. At Baltit they have also Anglicized the indigenous game by reducing the absurd and indefensible number of players, by persuading them to abandon the rule under which a goal was not scored until one of the side that had struck the ball between the posts had dismounted and picked it up, with the result of a frightful and even dangerous scuffle, and by somewhat modifying the pretty fashion of striking off. Under the native rules the opener of the game or the winner of the last goal galloped at full speed from one corner of the ground, with the whole of the rest of the field behind him, and when he came to the centre threw the ball into the air and struck it with his polo stick, frequently—such was the skill of the best players—scoring a goal from the stroke. There is a well-known Nagar player at the present moment who may usually be counted on for a goal in this fashion. At Baltit he now only gallops down one quarter of the distance before striking off; and his adversaries, awaiting him in the centre, have a chance of saving the goal. There is one respect, however, in which it is found difficult to modify the native practice, and that is in respect of "off-side" and "crossing," about which no scruple is entertained whatsoever. With its clumsy implements and with its ill-groomed steeds the native game of polo nevertheless excels in picturesqueness any that I have elsewhere witnessed. The men ride like demons, and perform feats of horsemanship of which the English game is innocent. At Chitral the beaten side had to dance to the victors; and it was the particular pleasure of the Mehtar (since unhappily murdered) to select as captain of the opposite team to himself, which was invariably beaten, an old gentleman who had previously made an unsuccessful attempt upon his life, and upon whom it amused him to wreak this playful revenge.

From Baltit Lennard and I commenced our march to the Pamirs. The distance to the Kilik Pass is about 81 miles, over one of the worst tracks in the world. At a little beyond Baltit the valley of the Hunza

river, which from Chalt has pursued an easterly course, turns due north, and the river cuts a deep gash or furrows an uproarious channel along its bottom in its descent from the watershed of the Pamirs. The scenery also changes. In place of the richly cultivated terraces and the

THUM AND WAZIR OF HUNZA.

abounding orchards of both the Hunza and the Nagar slopes in the lower valley, we find only rare villages and still rarer cultivation, and are in a region of rocks and stones. Big glaciers propel their petrified cascades to the very edge of the river. In many places this required

to be forded. Sometimes the road is only conducted round the edge of the precipices that overhang the torrent by artificial ladders and ledges, built out from the cliff with stones loosely laid upon supports of brushwood and timber jammed into the interstices of the rock. This sounds very dreadful, but in practice is much less alarming, the galleries, though only lasting for a few days, being sufficiently strong at the beginning, and being slightly inclined inwards toward the cliff. In the course of a very few days I underwent the bodily labours of a Parliamentary session, and parted with the superfluous physical accretions of an entire London season. Over this vile stretch of country there are two tracks, the upper or summer track, which avoids the river-bed, then filled with a fierce and swirling torrent, and climbs to the summit of the cliffs, several thousand feet above the water; and the lower or winter track, which can only be pursued when, the melting of the snow by the hot summer suns being over, the current dwindles to a number of fordable channels, across and amid the boulder-piled fringes of which the traveller picks his way. The second track is not commonly available till the beginning of October; but a few cloudy days had sensibly lowered the river, and it was thought that, with the aid of the Thum's people, who accompanied us in large numbers, the route might be found practicable, except in a few places where, to avoid the still swollen stream, we should require to scale the heights. The whole of our baggage, tents, etc., had to be carried on the backs of men, the route being quite impracticable for baggage-animals. We had riding-horses ourselves, but there were many places where these had to be abandoned and swum across the river. I was very favourably impressed with the Hunza men, who were strong, cheerful, and willing, and struck me as both the most masculine and the most agreeable of the Aryan tribes of the Hindu Kush. Those persons who contended that we should do an injury to them, and heap up trouble for ourselves, by interfering with their liberty, which, as interpreted by their chiefs, was merely the liberty to harry and plunder and slay their less manly or warlike neighbours, are shown to have talked nonsense, as croakers usually do. The people themselves extracted very little from the raids, the proceeds of which were commonly pocketed by the chiefs; and I have no doubt that many a converted freebooter lent a not unwilling back to the transport of our loads.

Perhaps the least agreeable part of the journey was the compulsory fording of the river, which was swift and icy cold, many times in the day. The Hunza men, however, are capital and fearless swimmers. Stripping, they plunged into the water and swam on either side of our ponies, holding them up and preventing them from being swept down. In order to reward them, we offered prizes for a swimming contest across the river and back. Their style is a hand-over-hand swimming, and many of the men were carried down at least 300 yards before they

succeeded in getting out on the further bank. They also swam with *mussuks*, or inflated goat-skins, lying with their stomachs on the skins and propelling themselves with their hands and feet. By this method in flood-time they bring their women across the river, strapping the lady on to a *mussuk* and swimming at its side themselves. This part of the valley is called Little Guhjal, its inhabitants being Wakhis who originally emigrated from Big Guhjal, or Wakhan, and who still speak the Wakhi language. On the second day we crossed the snout of three glaciers; one of which, the great Pasu glacier, comes striding down to the river's edge with a wilderness of *séracs* and ice-towers, and terminates in a prodigious moraine. On the third day we crossed the Batur glacier, which is a long twisting ice-flood over 20 miles in length. Its surface was split up with lofty pinnacles and crevasses, and we picked our way across in a little over an hour, over ice-hills sprinkled with a black gravelly *débris*. The retrospect was a frozen strait of choppy waves, ridge upon ridge of ice, some snow-white, others as black as soot. This glacier is constantly changing its track, and is sometimes quite impassable. In this neighbourhood, also, we observed gold-washing on the banks of the river, a man crouching with a wooden trough on a heap of stones by the water's edge, shovelling into it a pile of soil, and then laboriously washing and sifting it out with the aid of a bowl made from a gourd. In this way a few grains are penuriously extracted, and are bought by the Mir with grain, being used by him to pay his annual tribute of 20 ozs. of gold-dust to the Kashmir government, as well as a few *tolas* of gold, which for sake of historical scruples or political expediency, he is still most inexplicably allowed to pay to China.

On the fourth day we passed on the right or west bank of the river the *nullah* that conducts to the difficult Irshad Pass leading to Sarhad, in Wakhan, as well as to the Chilinji Pass, which conducts into the Karumbar valley of Yasin. Of both of these passes, hitherto undescribed and almost unknown, I shall have something to say later on. According to the presence or absence of snow on a particular peak in this part of the main valley do the Hunza people know whether the Irshad Pass is or is not open. A little later we crossed, on the east bank, the deep and narrow gorge down which the Khunjerab river flows from the Khunjerab Pass, leading on to the Taghdumbash Pamir. On the fifth day, following up the valley, which gradually rose, and was filled with clumps of willow and birch in the river's bed, we reached Murkush, just below the junction of the two *nullahs* that conduct respectively to the Kilik and Mintaka Passes, leading on to the same Pamir. Pursuing the former or left hand of these, we camped at an elevation of 13,360 feet (having risen 5300 feet since leaving Baltit), at a few miles from the foot of the Kilik Pass. On the morrow we crossed the latter. I took the elevation on the summit with a boiling-point thermometer, ordinary thermometer, and aneroid, and found it to be 15,870 feet. The

top of the Kilik is a long flattish plateau, covered with stones and interspersed with grassy swamps and standing water. There was no snow on the pass itself, though the snow-line was but little above us on the surrounding mountains, which were draped in white. This is the pass of which Captain Grombchevski, who crossed it in August, 1888, penned the somewhat hyperbolic report that it is "exceedingly easy, so that a cart with a full team of horses could follow it." Here we bade good-bye to the Thum of Hunza and his men, the limits of whose jurisdiction we had reached, and were met by the Kirghiz chief of the Taghdumbash Pamir, who is a Chinese subject, and who had received instructions to attend upon us while in Chinese territory. In his company we marched down about 6 miles to our new camp on the Taghdumbash.

Before leaving this portion of the Hindu Kush, or rather of that section of the main range which, extending from this point eastwards to the Karakoram, is locally designated the Mustagh range, let me say an additional word about the passes already mentioned, by which access across it is gained to the Pamirs. They are four in number, viz. in the direction from east to west, the Khunjerab, the Karchenai, the Mintaka, and the Kilik. The Khunjerab Pass * was visited on the north side by Captain Younghusband in 1889, and has since been explored by Lieutenant Cockerill. It is a winter pass only, and is all but impracticable for baggage-animals. Its elevation has been determined as 15,420 feet. The Karchenai Pass is reported to be even worse, but is still unknown. Mintaka means the "Pass of a Thousand Ibex," and is also locally called Kirish, i.e. *poshtin*, or sheepskin coat, which name appears in the Russian military topographical map as Kershin. The same map gives the elevation as 15,740 feet. Lieutenant Cockerill made it 15,430 feet; Captain Younghusband, 15,300 feet. It is an easy pass, free from snow in the summer, and practicable for ponies, and is the pass by which Captain Grombchevski rode back from Hunza in 1888 on to the Tagh dumbash Pamir. Lastly, as to the several altitudes that have been registered for the Kilik, whereas the Russian map marks it as 16,100 feet, Colonel Woodthorpe, in the Lockhart Mission in 1886, made it 15,600 feet by aneroid; Lieutenant Cockerill, 15,670 feet; myself by hypsometer, 15,870 feet. I would here say, with respect to the varying figures of different authorities, that not merely, as is obvious, must much, if not nearly all, depend upon the nature and reliability of the instrument employed —the aneroid, so far as my own experience goes, being a thoroughly capricious and untrustworthy guide at those elevations—but a good deal of the variation may also be accounted for by the difference of the actual spot in or near to the summit at which the observation is made. When a pass is deep in snow the track is obliterated, and a traveller makes his way across as best he can, and takes his altitude where the

* This is the pass called Ghundrab in Mohammed Amin's report. *Vide* Davies' 'Report on Trade Routes of the North-West Frontier,' Appendix, p. cccl vi.

position is most favourable. Only when the pass is snow-free can the mathematical summit be accurately determined. It will also have been manifest, from the description of the two passes last named, that while the crossing of the passes themselves is for some five months of the year attended with not the slightest difficulty either for man or beast, the real obstacles are only encountered, and the amazing military strength of the frontier is only ascertained after the passes have been crossed, and the descent begins into the gorges and defiles on their southern side. Crossing the Kilik or the Mintaka is by no means the same thing as getting to Hunza; and I may further add, that getting to Hunza is a very different thing from invading India.

From the summit of the Kilik Pass I looked down upon the first and

NATIVE POLO-PLAYERS.

easternmost of the tracts of country that are called Pamirs; and here, accordingly, I pause to discuss what that name means, how it arose, to what districts it applies, what are the distinctive characteristics, what the hydrography and the orography, and who the inhabitants of the country so named. To this I shall add a list of the mediæval travellers who in different ages are known to have visited or traversed the Pamirs, and a description of the various stages by which that country has been opened to our knowledge. Finally, I will name the European travellers who have in recent times penetrated to these little-known spots for purposes of official exploration, travel, or sport. As regards the literature of the subject, I need here only mention the writings of such travellers as have in modern times themselves visited the Pamirs,

and could therefore speak from eye-witness. Of these, five have written books in the English language: Captain Wood's account of his celebrated pioneer journey in 1837–8 to the Victoria Lake source of the Oxus;[1] Sir Thomas Gordon's description of the visit paid to the Pamirs in 1874 by certain members of Sir Douglas Forsyth's second expedition to Yarkand;[2] a translation of M. Bonvalot's French work describing his arduous spring crossing of the Pamirs in 1887;[3] (with which may be compared his companion M. Capus' independent account, in the French language, of the same journey[4]); Lord Dunmore's book;[5] and Major Cumberland's narrative of sport on the Eastern Pamirs.[6] Papers have further been communicated to this Society, and have been published in the *Journal* by certain of the above travellers, viz. by Captain Wood,[7] by Colonel Gordon[8] and Colonel Trotter[9] (his companion), and by Lord Dunmore,[10] as also by Mr. Littledale,[11] Captain Younghusband,[12] and Captain Bower.[13] To these must be added the invaluable compilations of two writers, in whom the lack of eye-witness was more than compensated by profound scholarship, viz. Sir Henry Rawlinson[14] and Sir Henry Yule.[15] Both, however, wrote at a time when geographical information about the Pamirs was singularly imperfect.

Firstly, as to the name Pamir. Its earliest known occurrence is in the description of the journey of the Chinese Buddhist pilgrim, Hwen Thsang, in the seventh century A.D. He crossed this elevated region and called it Pomilo, a name which resembles the pronunciation Pamil, still reported by some travellers as being used by the Kirghiz at the present day.[16] Marco Polo, more than 600 years later, called it Pamier.

[1] 'A Journey to the Source of the River Oxus.' By Capt. John Wood, I.N. New edit. London: 1872.

[2] 'The Roof of the World.' By Col. T. E. Gordon. London: 1876.

[3] 'Through the Heart of Asia.' Translated by C. B. Pitman. 2 vols. London: 1889.

[4] 'Le Toit du Monde.' Par G. Capus. Paris: 1890.

[5] 'The Pamirs.' By the Earl of Dunmore. 2 vols. London: 1893.

[6] 'Sport on the Pamirs.' By Major C. S. Cumberland. London: 1895.

[7] *Journal of the R.G.S.*, vol. x., 1840, p. 530.

[8] *Ibid.*, vol. xlvi., 1876, p. 381.

[9] *Ibid.*, vol. xlviii., 1878, p. 173. *Vide* also Colonel Trotter's report in the published Report of the Forsyth Mission. Calcutta: 1875.

[10] *Geographical Journal*, vol. ii., 1893, p. 385.

[11] *Proceedings of the R.G.S.*, vol. xiv., 1892, p. 1.

[12] *Ibid.*, vol. xiv., 1892, p. 205.

[13] *Geographical Journal*, vol. v., 1895, p. 240.

[14] "Monograph on the Oxus," in the *Journal of the R.G.S.*, vol. xlii., 1872, p. 482.

[15] "Papers connected with the Upper Oxus Region," in the *Journal of the R.G.S.*, vol. xlii., 1872, p. 438; and Introduction to new edition of Wood's 'Oxus,' 1872.

[16] *E.g.* Fedchenko and Capus (*As. Quart. Rev.*, 1892, p. 238). Marco Polo can hardly, however, have acquired the name, as Prof. Vambéry has suggested, from the Kirghiz, since it was not till the sixteenth century that they came into the Pamirs, being driven southwards by the Kalmuks.

Mirza Haidar, a prince of Kashgar, whose work, the 'Tarikh-i-Rashidi,' written about the year 1543, has recently been edited by Mr. Ney Elias, adopted the modern form, Pamir.[1] The Portuguese Jesuit, Benedict Goes, in 1603 used the phrase Serpanil, which, as Yule suggested, probably signifies Sir-i-pamir, *i.e.* "Head of the Pamir;" a name closely analogous to the Sir-i-kul, or "Head of the Lake," which was mentioned to Wood in 1838, and mistaken by him for the title of the Great Pamir Lake itself. The Kirghiz whom I met adopted the pronunciation Pâmĕr rather than Pâmîr. The use of the name, in some form or other, is therefore amply attested for a period of 1200 years.

What, then, is its origin? Here an ample field has been provided for the ingenuity alike of the amateur philologist and of the student; nor can it be said that the scholarship of the one has carried us much further than the conjectures of the other. The various suggestions may be classified according as the word is supposed to be of Sanskrit, of Turki, or of Persian origin. Under the first heading falls the conjecture of Burnouf,[2] who regarded it as a contraction of *Upa Meru*, i.e. the country above Mount Meru, the legendary holy mountain of Hindu mythology, which was supposed to be the abode of the gods, and the centre of the universe. To the same class belongs Sir H. Rawlinson's conjecture that the word may be a contraction of Fan-mir, or Famir (the Arabic pronunciation), *i.e.* the lake country of the Fani, or Φανοι, who, according to Strabo (Lib. xi. cap. 14), founded the Greek kingdom of Bactria to the east; *mir* being, he says, a Sanskrit word signifying primarily "sea" (e.g. *mare*, *mer*, and English *mere*), but also "lake," a form which reappears in Kash-mir and Aj-mir.[3] To this theory the objection among others may, I think, reasonably be taken that there is no ground for adopting the Arabic pronunciation, the more so as the name "Pamilo" has been shown to have been in common acceptance long before the Arabs can ever have heard of the word at all. Next comes the Turki school. Colonel Gordon and the members of the Forsyth Mission in 1874 were told by their guides that the word meant "a wilderness, a place depopulated, abandoned, waste, yet capable of habitation." Professor Vambéry has likewise said that it means "a plain or sterile tract of country." For this interpretation I believe there to be no foundation other than the inventiveness of the Kirghiz guides, who, like most cicerones, are not firstrate etymologists. Dr. Leitner has said, but I do not know on what authority, that it is a Turki or Yarkandi word meaning "high plain, elevated valley, tableland, or plateau." Major Montgomerie's Mirza suggested the

[1] 'The Book of Prince Hyder of Kashgar.' Edited with notes by Ney Elias. London: 1894. *Vide* also a condensed account of the same work by R. B. Shaw, in the *Journal of the R.G.S.*, vol. xlvi., 1876, p. 277.

[2] *Vide* Humboldt's 'Asie Centrale,' vol. i. p. 104; vol. ii. p. 390.

[3] *Journal of the R.G.S.*, vol. xlii., 1872, pp. 489, 496.

derivation *pa* (belongs), and *mir* (chief), *i.e.* the territory belonging to the chief of Badakshan, which is, of course, absurd. Finally, there is the school of Persian partisans, whose hypotheses do not in every case err on the side of timidity. By some of these the word Pamir is said to be a contraction of Bam-i-Dunya, or "Roof of the World," another local appellation for the same region, which was mentioned to Wood in 1838. This, I think, is frankly fantastic. Others have suggested Bam-yar, or "Roof of the Earth" (*bam* being a Persian and *yar* a Turki word), which is perhaps worse. Finally comes a series of derivatives of the Persian word *pai*, signifying "foot," and some word of kindred sound to *mir*. Of these the least fanciful, and, if a Persian origin be accepted, to my mind the most likely, is the combination *pai* and *mir*, the latter, whether identical or not with the mythical Meru, being a word of not uncommon Central Asian use for "mountain," * as, *e.g.*, Tirich Mir, the famous mountain in the north of Chitral; Deo Mir, the local name for Nanga Parbat; and Mir Kalan (*i.e.* Big Mountain), a familiar peak in the Peshawur valley. I should not be so much inclined to identify the Mir in question with any particular peak as to suppose that the allusion may be to the great ranges—the Trans Alai on the north, the Mustagh Ata on the east, and the Hindu Kush on the south by which the Pamir region is ringed, and at whose feet it may legitimately be said to lie.

I next turn to the physical characteristics of the country so named. And here I confess that the gravest misconception appears to have prevailed, and may perhaps even still prevail, in this country as to what the Pamir or Pamirs really are. Only three years ago they were described by an eminent English geographer as a "vast tableland." In a leading article in the leading newspaper they have more recently been said to consist of "a series of bare and storm-swept downs." The word "steppe" is also of frequent application in popular parlance. There is quite a remarkable concentration of these errors of a slipshod nomenclature in a passage in Yule's Introduction to the second edition of Wood's 'Journey to the source of the Oxus,' published as recently as 1872. "We know now with something like certainty that the core of this mountain mass forms a great elevated plateau, the greatest part of which appears to consist of stretches of tolerably level steppe, broken and divided by low rounded hills." Elsewhere he writes, "Mountains in some places lift themselves out of the steppe."

Now, beyond the fact that the general elevation of the Pamir valleys is from 12,000 to 14,000 feet, and that they are consequently at a higher level than the surrounding countries, there is nothing in their superficial character in the least degree calculated to suggest a tableland or plateau, which I take to mean a broad stretch of flat and elevated land,

* In Baber's 'Memoirs' (translated by Leyden and Erskine), p. 313, *Mir* is said to mean a hill.

surrounded, maybe, and even interspersed, but not positively broken up, with mountain masses. Nor can anything less like a down or a steppe be conceived than the troughs or valleys, of no great width, shelving downwards to a river-bed or lake, and uniformly framed on either hand by mountains whose heads are perpetually covered with snow, which anybody who has been to the Pamirs will at once recognize as a fair description of those regions. In reality, over the entire region embraced by the title, it has been calculated that the plains or valleys constitute less than one-tenth of the total area. Correctly described, a Pamir in theory, and each Pamir in fact, is therefore neither a plain nor a down, nor a steppe, nor a plateau, but a mountain valley of glacial formation,

BAND AND SPECTATORS ON POLO GROUND.

differing only from the adjacent or other mountain valleys in its superior altitude, and in the greater degree to which its trough has been filled up by glacial detritus and alluvium, and has thereby approximated in appearance to a plain owing to the inability of the central stream to scour for itself a deeper channel; this inability again being attributable to the width of the valleys and the consequent absence of glaciers on any scale, and to the short summers, which do not last long enough or experience a sufficiently fierce sun to admit of a very powerful erosive impetus being communicated to the melting snow.

Every Pamir, then, that I saw possessed the same characteristics associated with a greater or less width. These were—the bordering

presence of successive mountain peaks, snow-crowned above, sometimes seamed with ice-fields, and terminating in steep shingle slopes or boulder-strewn undulations lower down; in the bottom of the valley a river or stream or mountain torrent, noisily spreading itself over a stony bed or meandering in a peaty track, and sometimes feeding a lake or succession of lakes; and on either bank of the stream or lake a more or less level expanse of spongy soil, usually covered with a coarse yellow grass, and frequently broken up by swampy patches exactly like the ground on a Scottish moor. With the grassy stretches, which are green and flower-bestrewn in the summer only, and during the rest of the year—when not covered with snow—are sere and yellow, are interspersed expanses of sand and clay and stones, very often overlaid with a powdery incrustation of magnesium (where the saline properties in the soil have become exhausted) that glitters like a hoar-frost in the sun.

The main and differentiating features, therefore, of a Pamir are the abundance of pasturage, affording excellent food for every variety of animal; and the almost total absence either of timber or of cultivation. There are parts of the Pamirs where a few trees grow, and where a scant tillage is practised;* but these are not sufficiently numerous to invalidate the general proposition which I have stated. Hence it arises that such opposite verdicts have been passed by different travellers upon the fertility or reverse of the Pamirs. Those who expect some sort of forest growth, some signs of plantation, natural or artificial, or some evidences of settled human habitation, have, on finding none of these, denounced in savage terms the sullen inhospitality of the scene. Those, on the other hand, who have seen either their own animals or the Kirghiz flocks grow fat upon the succulent Pamir grass have spoken in glowing terms of these mountain pastures. The fact is that the Pamirs are both fertile and barren, both habitable and desolate, both smiling and repellent, according to the point of view from which they are regarded. They are among the deliberate paradoxes of nature.

* These are in the adjoining valleys rather than on the Pamirs themselves. Ivanoff mentions a forest growth consisting of creepers, reeds, rose, willow, dwarf birch, mountain poplar, bramble, liquorice root, honeysuckle, spurge, and black currant; but the traveller will certainly meet with few or none of these on the ordinary Pamirs. He also says that barley and wheat are sometimes cultivated; but this has not been the experience of the Russian garrison of the Murghabi fort or Pamirski Poste, who, during the few years of their occupation, have attempted, with little or no success, to grow potatoes, radishes, and other vegetables. The poverty of the resources is really, however, best indicated by the paucity of inhabitants. In 1892 the *Turkestan Gazette* said that the only permanent population of the Pamirs consisted of 250 *kibitkas* or 1500 Kirghiz, and these of inferior breed and stamina. Their number is said now to have fallen to 1000. A previous number of this Journal (February, 1893, p. 159) contained an extract from a lecture delivered at Moscow in January, 1893, by a Spanish traveller, M. Ximénès, on his alleged recent travels in the Pamirs, in the course of which he said, "The magnificent pasture-lands of the Pamirs afford nourishment to herds of superb cattle and excellent mountain horses." M. Ximénès, however, I have reason to believe, was never nearer to the Pamirs than Tashkend.

It is owing to the climatic conditions under which this peculiar region subsists that the unfavourable verdict has on the whole prevailed. Possessing a mean elevation of from 12,000 to 14,000 feet above the sea, with peaks that rise to 20,000 feet and higher, buried deep in snow during seven months of the year, and often inaccessible for a much longer time, scourged by icy blasts, destitute of any fuel, save that which is provided by the dung of animals or the roots of desert scrub, and devoid of the meanest consolations of life, it is not surprising that the Roof of the World has been generally voted one of its least desirable portions, and until quite recent times, when fresh reasons were discovered for its examination, has been tacitly excluded from the itinerary of the most intrepid of explorers. That, however, is no reason why we should call it what it is not, or perpetuate the errors of a more ignorant time.

There are eight claimants to the distinction and title of a Pamir, whose pretensions appear to be sufficiently established by local usage, though it is a mistake to suppose that the nomad Kirghiz will at once in each case recognize them by the accepted geographical name. They are as follows:—

1. The Taghdumbash, or Supreme Head of the Mountains Pamir. This is the Pamir lying immediately below and to the north of the Kilik Pass. It is closed on the west by the valley leading up to the Wakh-jir pass into Wakhan, from which point it first stretches away in an easterly direction to Ujad-bai, where it receives a second fork or bay coming from the direction of the Khunjerab Pass on the south, and then turns north, till it finally terminates at the Chinese fort of Tashkurghan, a total distance of about 60 miles. This Pamir lies in a different watershed from the whole of the remaining Pamirs, and is physically, as well as politically, part of a different system. Its elevation ranges from 10,000 feet at its northern to 15,000 feet at its western extremity, and its breadth varies from 1 to 5 miles. Its inhabitants are Kirghiz, Sarikolis, and occasionally a few fugitives from Wakhan. They are under the jurisdiction of China, whose authority is represented by sixty soldiers in the fort at Tashkurghan, and who is as ignorant of the real conditions in her Pamir dominions, and as utterly incapable of defending them, as she has recently been proved to be in places that are the keys of the empire and under the very eye of the central government. At the time of my visit the Kirghiz head-man, who was responsible to the Chinese for the local jurisdiction, was Kasim Beg, who, with his family and flocks, was a fugitive from the more westerly Pamirs that had been occupied by Russia. He has since resigned the post.

2. The second Pamir is the Pamir-i-Wakhan, a narrow strip of grassy valley extending upon the northern bank of the Ab-i-Wakhan, or head stream of the Oxus, for about 20 miles from some distance below its source down to Bozai Gumbaz. It is the narrowest of all the Pamirs,

and is entirely uninhabited, but contains excellent grazing on the slopes.

3. The third is the Pamir-i-Khurd, or Little Pamir, which begins on the south in the valley of the Sarhad branch of the Oxus, a little above Bozai Gumbaz, encloses Lake Chakmak and then runs in a north-easterly direction upon either bank of the Aksu river to the destroyed and evacuated Chinese fort of Aktash. Its total length up to this point is about 60 miles, and it is here separated by a mountain range of no considerable breadth, crossed by the Neza Tash pass (14,920 feet) from the head of the Taghdumbash Pamir and the rival watershed of Chinese Turkestan. This Pamir varies from 1 to 4 miles in width. Though it is commonly regarded as terminating at Aktash, the valley continues with very much the same characteristics in a north-west direction, towards the junction of the Aksu river with the Ak-baital—an almost identical distance—but local caprice seems never to have invested it in this part with the title of a Pamir.

4. The fourth Pamir, as its name implies, is both in length and width the most considerable of all. This is the Pamir-i-Kalan, or Great Pamir, which commences on the south-west at a point below Yol Mazar, in the valley of the Pamir River branch of the Oxus, first explored by Wood, and then runs in an easterly direction, containing Wood's or Victoria Lake, and the small chain of lakes at its eastern extremity, and extending for a total length of about 80 miles as far as the watershed of the Aksu. Its width varies from 1 to 6 miles.

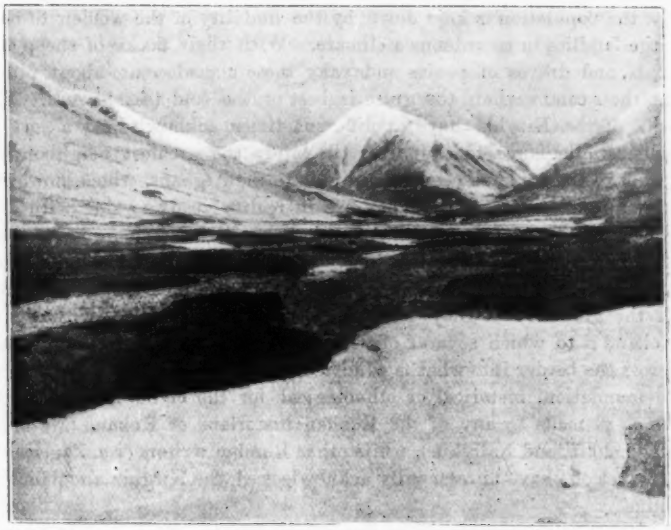
5. Continuing to the north, we next come to the Alichur Pamir, reaching on the west to the borders of Shighnan, drained by a river of the same name, and including the chain of lakes known as Yeshil Kul or Green Lake, Bulun Kul, and Sasik Kul or Putrid Lake. This Pamir is separated on the north by a lofty range of mountains from the next adjoining basin of the Murghab or Aksu.

6. In the watershed of the latter there appears on several maps, and there has been reported by more than one traveller as existing, the Sarez Pamir. In so far as the name is associated with that portion of the valley of the Murghab near Sarez, it has been pointed out by Mr. Ney Elias that it is a misnomer, since the valley there is very mountainous, and has none of the characteristics of a Pamir. Captain Younghusband, however, gives the name to a small piece of more open and grassy valley about 10 miles long below the Russian fort of Murghabi, from which it would appear that the title has been shifted to some distance from the original Sarez.*

* The Sarez Pamir was first reported by Pundit Manphul in 1867 (Davies' 'Report on Trade-Routes of the North-West Frontier,' Appendix, p. cccxxxii.) Colonel Gordon in 1874 speaks of the "Siriz Pamir as a continuation of the Aktash valley from Akbalik (*i.e.* the junction of the Aksu and Ak-baital) westwards to Bartang, the commencement of inhabited Shighnan, on the west" ('Roof of the World,' p. 158). Colonel Trotter on his map called it Sariz Pamir, but spelt Sirich Fort.

7, 8. The seventh and eighth Pamirs may be more rapidly dismissed. They are the Rang Kul Pamir, containing the lake of that name, which was formerly a Chinese but is now a Russian possession; and the Khargosh or Hare Pamir, which contains the basin of the Great Kara Kul Lake, and lies along the valley of the small stream that flows into it from the south, and along its eastern shore.

These are the main and authentic Pamirs. There are various other stretches of country to which the name has sometimes been applied, but to which it cannot be considered indisputably to appertain. These are, on the western side of the recorded Pamirs, the Pamir-i-Bugrumal, a valley below Yeshil Kul near the head of the Ghund valley, which



OVIS POLI GROUND, TAGH-DUM-BASH PAMIR.

was mentioned by Colonel Trotter; and on the eastern side, the Marion or Marian Pamir, which is depicted on some maps as an easterly branch of the Taghdumbash Pamir; and further, again, to the north the Sarikol Pamir. Sarikol, however, is not a Pamir, but a district, and the title is therefore a misnomer. It has also been said that the country lying on the Sarikol side of the Shimshal Pass in the Mustagh range, by which the Kanjutis used to make their raids upon the Yarkand-Leh caravans, is called by them the Shimshal Pamir.* Colonel Gordon further spoke of the Shiwa Pamir in Badakshan.† In each of these cases the appellation,

* *Vide* Biddulph's 'Tribes of the Hindu Kush,' p. 26.

† 'Roof of the World,' p. 162.

even if based upon physical resemblances, seems to be supported by insufficient evidence or usage, and cannot therefore be sustained.

As to the total area of the Pamirs proper, Sir H. Yule said that the plateau, as he called it, was at least 180 miles from north to south, and something like 100 miles from east to west. Mr. Freshfield, at a meeting of this Society in 1892, gave the figures as 280 miles of length by 120–150 miles of breadth. I calculate that the extreme length and breadth are almost exactly equal, and I reckon both at 150 miles, as measured by a compass upon the map.

I have already alluded to nomad Kirghiz as almost the sole inhabitants of the Pamirs. They are supplemented in a few places by wandering camps of Wakhis, Sarikolis, and Tajiks from Shighnan; but the population is kept down by the inability of the women to bear large families in so arduous a climate. With their flocks of sheep and goats, and droves of ponies and yaks, these nomads roam about, pitching their camps where the grass is best or the cold least severe. The bulk of the Kirghiz have at different times acknowledged a sort of general allegiance to China, as till lately the greatest neighbouring Power. Others have been subordinate to the Afghans, whom, however, they appear not to like. They are in reality ready to side with any power and to profess any allegiance that will least compromise their own independence. The Russians, since their appearance on the Pamirs, have claimed to exercise a sort of general suzerainty over the Kirghiz, on the ground that they were subjects of the annexed Khanate of Kokand; to which several of the tribes have replied by emigrating across the border into what is admittedly Chinese territory. I know of no foundation, historical or ethnological, for the claim, no mention of which is made by any of the Russian historians of Kokand (Nazaroff, Khoroshkin, and Nalivkin), while other Russian writers (*e.g.* Zagriashki and Radloff) have unreservedly acknowledged the Kirghiz allegiance to China.

I need not say much about the Pamir climate. It is widely known that for six if not seven months of the year, and certainly from the middle of November to the end of April, the Pamirs are deeply covered with snow, the lakes are frozen, and the passes are well-nigh impassable. The experience of the French travellers, Messrs. Bonvalot, Capus, and Pepin, who crossed the entire region from north to south in April, 1887, gives a fair indication of what may then be expected. On the other hand, at their entrenched encampment of Murghabi or Pamirski Poste, situated at the junction of the Aksu and Ak-baital rivers, at an elevation of 12,150 feet, we know that 200 Russians have now been stationed throughout the winter for nearly three years. They are reported to have suffered severe hardships, but are well accommodated and housed.* The

* Since the Russians were installed at Murghabi, lat. 38° 8′, long. (from Pulkowa) 43° 37′, an opportunity has been offered, for the first time in history, of making

Kirghiz detest the neighbourhood of Lake Victoria, and will never voluntarily encamp there, saying that the climate gives them pain in the throat and chest. Their women find great difficulty in child-bearing on the Pamirs, the offspring being usually stillborn. Similarly, at Pamirski Poste the Russians have been unable to keep poultry alive, and have found that dogs will only breed once in three years. In the more southerly Pamirs the chief drawback to comfort is the wind, which usually blows with cutting intensity at some time in the day, and is worse than the cold. In Wakhan there is a particularly vicious wind, named the Bad-i-Wakhan, which blows steadily down the valley of the Oxus without intermission for weeks at a time, but sometimes takes the opposite direction. When I was on the Pamirs in September and October, the temperature, though it commonly sank to below zero (Fahr.) in the night or early morning, was delightful as soon as the sun was high. The air was crisp and invigorating, and, except when the wind was blowing, a more exhilarating climate could not be conceived. I did not myself feel the rarefaction of the air at all seriously below 16,500 feet; but our camp-followers, notably those who had come from India, were affected at a considerably lower level.

As regards the fauna of the Pamirs, I may refer for birds to the

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continuous meteorological observations on the Pamirs. The Paris Geographical Society published in its *Comptes Rendus*, No. 1, 1895, the following table, which contains an entire year's observations, from September, 1893, to September, 1894. I have converted the Centigrade into Fahrenheit scale.

Year.	Month.	Mean temperature, Fahr.	Mean nebulosity, per cent.	Rainfall, millimetres.	Prevailing wind.
1893	September	47°	32	2·0	S.W.
	October	30°	22	0·0	S.W.
	November	17°	30	0·1	S.W.
	December	9°	47	4·2	S.W.
1894	January	−13°	56	2·8	S.W.
	February	0°	50	0·9	S.W.
	March	22°	44	0·7	N.E.
	April	34°	44	9·4	N.E.
	May	42°	42	12·4	N.E.
	June	54°	35	4·7	N.E.
	July	62°	50	11·3	N.E.
	August	56°	19	0·0	—

During the above period the minimum temperature recorded was −47° Fahr. in January, and the maximum 82° Fahr. in July. It froze in the morning during every month of the year. The rainfall is the lowest in the entire Russian Empire, seven times less than at Tashkend, and twice less than at Khiva. The north-east winds are much more violent than the south-west, and frequently culminate in hurricanes. In August there is a sort of equilibrium, and the winds blow equally from all points of the compass. Then also the sky is most clear. For some further information on the meteorology of the Pamirs, *vide* M. Capus' notes published in the Bulletin of the Paris Geographical Society, 1892, p. 316.

well-known paper of Severtsoff (translated in "The Ibis" of 1883). He mentions 120 different species, some breeding in the Pamirs, others only migratory, but none absolutely peculiar to the region. I saw myself wild geese and wild-fowl of many descriptions on the lakes. There were also snipe; I shot a quail at an elevation of nearly 14,000 feet on the northern slopes of the Chakmak Lake, and I saw them at 15,000 feet on the Taghdumbash Pamir. Lord Dunmore saw the common seagull on Victoria Lake. *Chikor*,* a bird resembling the French partridge, are very numerous in the Oxus valley, and snow-cocks or snow-pheasants have been frequently reported.† I saw eagles and lammergeier overhead. Hares positively swarm on the Taghdumbash, hopping about among the rocks and stones. There were also numbers of silver foxes, scurrying from burrows in the sandy soil, and a species of marmot. Colonel Gordon also mentions the lynx. Fish are very plentiful in the lakes, and many of the streams swarm with trout. Among the larger fauna, brown, red, and grey bears, snow-leopards and ibex are encountered in the mountains, and wolves and wild dogs chase the *Ovis Poli* over the snowy ridges. The latter animal, or celebrated ram of the Pamirs, is, of course, the chief glory of the region, whilst, owing to the extreme remoteness of its haunts, it still remains the most cherished object of the modern sportsman's ambition. So little information of any scientific value is, however, to be found about it in the English language, that I am tempted to add here the results of my own investigations.

The *Ovis Poli* is only one, though the largest and most famous, of a group of wild sheep that are found in many localities over a wide range in Central Asia, constituting a *genus*, the distinction of whose individual species still lacks scientific determination. Of these the *Ovis Poli*, *Ovis Karelini* (so named from the Russian explorer, Karelin, who was the first to obtain a specimen in the Ala Tau near Semirechinsk, in about 1840), *Ovis Heinsii*, *Ovis Nigrimontanei*, and *Ovis Argali*, have been separately named; the only authority who has devoted a first-hand and exhaustive inquiry to the subject being the Russian naturalist, Severtsoff.‡ The *Ovis Poli* and *Ovis Karelini*, however, share a large

* This is the small *chikor*, or Himalayan red-legged partridge (*Caccabis Chukor* of Gray) which Moorcroft in his travels mistook for the francolin.

† The snow-cock (*Tretraogallus Himalayensis* of Gray) is identical with the larger *chikor*, a bird as big as a hen-turkey, described by Moorcroft and Vigne, and frequently mentioned to me in the Hindu Kush region, though I never encountered it.

‡ His treatise on the 'Mammals of Turkestan,' translated from the *Trans. of the Imp. Soc. of Naturalists of Moscow*, vol. viii., 1873, appeared in the *Annals and Magazine of Natural History*, vol. xvii., 4th series, 1876, pp. 171, 210, 217–220, 220–226. In the *Proceedings of the Zoological Society of London* have also been printed a number of papers by English writers, viz. Blyth, 1840, p. 62; P. L. Sclater, 1860, p. 443; Colonel Gordon and Dr. Stolicza, 1874, pp. 53, 425; Captain Biddulph, 1875, p. 157; Sir V. Brooke and B. Brooke, 1875, p. 509; W. T. Blanford, 1884, p. 326. The majority of these relate to the *Ovis Poli*. For accounts by sportsmen of the pursuit of the latter animal, *vide* St. G. Littledale, cap. xii. vol. ii. of 'Big Game Shooting,' in the Badminton Library; and Lord Dunmore and Major Cumberland in the books before cited.

number of characteristics, which differentiate them to some extent from the remaining species.

The *Ovis Poli* was first so named by Blyth (in compliment to its original description by Marco Polo), from a head sent home by Captain Wood from Lake Victoria in 1838. Wood misnamed the animal *kutch-kar*, whereas Blyth identified the *ras* or *roosh*, mentioned by Burnes, with the *Ovis Poli*. The Kirghiz name, which I always heard employed, was *gulcha* or *gulja* for the male, and *arkar* for the female. The latter is a smaller animal, and has short horns, lying rather backward.

It is for his magnificent horns, of immense thickness, extraordinary length, wide span, and, in the case of the older rams, double convolution, that the male is specially renowned. The biggest head known to exist is one that had been picked up (not shot), and was presented to Lord Roberts by the Maharaja of Kashmir. Its length from base to tip of the horn is 75 inches; circumference of horn at the base, 16 inches; width of horns from tip to tip, 54½ inches. The recent Boundary Commission measured a single horn of a broken skull, which was lying in a heap at the mouth of the Urta Bel pass, and found it 72 inches. The largest head in the Natural History Museum at Kensington measures 68 inches in the horn, and is from the collection of the late Mr. A. Dalgleish. The biggest head that has fallen to the rifle is 65 inches. The horns are ringed by well-marked indentations or annulations, corresponding to the age of the animal; although it is only the minimum age that can be determined, since the original rings get blunted and worn away as they grow towards the extremity. Enormous numbers of skulls and of broken or rotting horns are strewn all about the Pamirs, and are often collected by the Kirghiz in heaps. Judging from their extraordinary abundance, the mortality arising from attacks by wolves and wild dogs, from the severity of the climate, and from combats among the males, must be very great.* The breeding season of the females begins in October.

The locality in which *Ovis Poli* have been chiefly, if not solely, encountered by Englishmen, is the Pamirs. Throughout the region between the Great Kara Kul and the southern boundary of the Taghdumbash Pamir they are found in large herds. I did not myself observe more than fifteen or twenty in a herd, but as many as three hundred were seen by the recent Boundary Commission at one time. Their *habitat*, however, is by no means confined to the Pamirs, which are merely the south-west corner of their range. Severtsoff says they were met by Semenoff in great abundance on the high plains of Aksai, and of Khan Tengri in the Tian Shan mountains, and about the sources of the rivers Karkara, Tekes, and Sarijazin, to the east and south-east of Issik

* The story is told of the *Ovis Poli*, as of other mountain sheep, that, when jumping, the excessive weight of the horns sometimes makes the ram lose his balance and pitch on to his head. But I doubt if there is any foundation for this tale.

Kul. From here their range extends in a south-westerly direction to the Narin, the upper Sir Daria, and the tributaries of the Kashgar Daria, *i.e.* as far as the Alai. The lowest elevation, however, at which Severtsoff or Semenoff reported them was about 10,000 feet. The *Ovis Poli* may be said, therefore, to have a double *habitat*, the western Tian Shan and the Pamirs, separated from each other by the Great Alai.

Here, however, we are met by the as yet unsolved problem of the precise identity of the brother sheep, or *Ovis Karelini*. The latter was shot by Forsyth's and Gordon's party in 1872, in the western Tian Shan, to the north-west of Kashgar. They thought it the same as the *Ovis Poli*, though it had smaller horns; but later on, when they compared the two species at Calcutta, they thought them distinct. Undoubtedly there are superficial differences of a marked character, which render the majority of specimens easy of distinction. These differences may be thus summarized:

Ovis Poli.	Ovis Karelini.
Habitat.	
The range of *O. P.* has already been mentioned. At one place, viz. Ulan, above the mountains of Atpash, Severtsoff found *O. P.* and *O. K.* living together.	*O. K.* has not been met with in the Pamirs. It is very plentiful, however, in the Semirechinsk province, north of Issik Kul, in the Altai and Sapliski Altai, and in the mountains and plains between the rivers Chilik and Keben, east of Turgeli; and its range is partly identical with, partly to the northward of, that of *O. P.*
Elevation.	
O. P. has not yet been reported at a lower elevation than 10,000 feet, but is encountered up to 17,000 feet.	*O. K.* is found at every elevation from 2000 to 12,000 feet.
Size of Animal.	
O. P. is a larger animal. Severtsoff gave the average height at shoulder as 3 feet 10 inches, average length as 6 feet 7 inches.	Average height of *O. K.* at shoulder is 3 feet 6 inches; average length, 5 feet 10 inches to 6 feet.
Colour of Neck and Mane.	
O. P. has a much longer and whiter mane, which is 3 to 4 inches long on the spine, and 6 to 7 inches on the throat and neck.	There is more brown and grey hair in the mane of *O. K.*, which is also shorter.

Length of Horns.

Herein lies the main difference. The horns of *O. P.* are more than four times the length of its skull. Longest recorded horn, 75 inches.

O. K.'s horns are only three times the length of its skull. Longest recorded horn, 48½ inches.

Span and Curve of Horns.

O. P.'s horns have a much wider span, and branch further away from the head. In the case of the older rams, they also describe the beautiful twofold outward curve.

O. K.'s horns are set closer on the head, describe a narrower sweep, and (so far as I have seen) never attain the double twist.

These are the main superficial differences between the majority of the observed specimens of the two sheep. On the other hand, there occurs a point at which even these salient characteristics appear to blend, and at which no immutable difference is left between them. In other words, the abnormal *Ovis Poli* can scarcely be distinguished from the normal *Ovis Karelini*, nor the abnormal *Ovis Karelini* from the normal *Ovis Poli*. Hence it has been contended by Mr. Blanford and others that to speak of them as belonging to different species is erroneous. Perhaps it would be safer at this stage to say that the examination of a much larger number of specimens coming from a much wider area than is accessible, at any rate to the English student, is required, before the latter can arrive at any scientific induction. St. Petersburg would probably afford better materials for such a scrutiny than London. In our Natural History Museum *Ovis Karelini* is labelled as a variety of *Ovis Poli*, because of the prior discovery of the latter.

The mention of Marco Polo's sheep brings me back to the point at which I left my own journey to embark upon a general digression on the Pamirs. This was near the westerly termination of the Taghdumbash Pamir. There the Kirghiz had pitched for us three of those circular huts of felt, spread over a wickerwork frame, which are variously called *akoi* (*i.e.* white house) and *yourt* by the Kirghiz, *kibitka* (a Tartar word) by the Russians, and *kirgah* (*i.e.* warm place) by the Afghans. In cold regions like the Pamirs they are incomparably better and more comfortable than any tent. A fire can be lit inside, and the amount of ventilation and degree of warmth can be regulated by pulling the felt coverings on or off the roof. During my subsequent march through Afghanistan in December from Kabul to Chaman, I invariably slept in a *kirgah* lent me by the Amir. The Russian soldiers, in their fort at Murghabi on the Pamirs, are similarly installed.* On

* The lower part of the hut is made of a framework of willow sticks, which, when pulled out and fixed, covers a diameter of about 14 feet. These constitute the outer

the Taghdumbash, Lennard and I devoted four days to stalking *Ovis Poli* in the neighbouring *nullahs*. Of these the favourite one for European sportsmen, and the spot where the bulk of the large heads have so far been obtained, is the Kukturuk *nullah*, which runs for a distance of between 4 or 5 miles between lofty mountains in a north and north-westerly direction from the Pamir. A stream courses along a stony bed in the bottom of the valley, which is not more than a quarter to half a mile wide. At its upper end stands a curious mountain with a pointed summit like a tooth, to the right and left of which the valley splits into two smaller *nullahs*, which are presently blocked with snow. I

AKOI, OR YOURT.

was lucky enough, in the course of only two days' stalking in the Kukturuk, to get two heads, though the dimensions of the larger of these, 54 inches along the outer rim of the horns from the base to the tip, could not be compared with the big heads of 60 inches and upwards that have been shot by Littledale, Lennard, and other sportsmen. The fact is, that so circumscribed is the area, not in which the *Ovis*

walls, and are covered outside with reed mats and felts, which are sometimes kept in place by richly embroidered needlework belts. On to the top of this framework, which is 5 feet in height, are tied curving willow rods, which converge upwards towards the roof, where a circular aperture is left nearly 5 feet across, further transverse oziers forming an open dome, over which the roof-felts are pulled by outside cords. The total height from floor to apex is from 10 to 12 feet.

Poli exists, but in which it has hitherto been procurable by British sportsmen, and so serious have been the depredations made by recent visitors upon the accessible herds within this area, that there is already a sensible diminution in the number of first-class heads that are seen; and unless some measures are adopted to regulate the exuberant zeal of the hunters who take advantage of passports to Chinese Turkestan to decimate the resources of the Taghdumbash Pamir, the time cannot be far distant when the finest of these magnificent animals, instead of peering from their native retreats in the Kukturuk *nullah*, will only be visible behind a glass case in European museums. It is nothing less than an absurdity that, while English officers and travellers are prohibited by the Indian Government from crossing the Hindu Kush for fear of exciting Russian susceptibilities on the Pamirs, they should be able to arrive at exactly the same destination and to inspire the self-same alarms, whether real or hypothetical, at the same time that they render such an ill service to genuine sport, by adopting the circuitous route of the Karakoram and Yarkand. If some sensible restriction, however, be placed both upon the facilities afforded to travellers, and upon the number of heads that they are permitted to kill, there is no reason why the famous ram of the Pamirs should not remain the supreme and legitimate object of the sportsman's desire for many years to come. I should add that we were on the ground at the wrong time of the year for sport. All the big bags have been made in the late spring and early summer, when there is still plenty of snow, and the rams come down to feed upon the young grass that is then springing by the streams. No severe climbing is at that season required in their pursuit; the animals furnish very easy shots, and their retreat is frequently impeded by the depth of the snow. In the late autumn, on the other hand, they spend the greater part of the day above the snow-line and on the topmost peaks. In my own case I had to climb after them through the snow to an elevation of approximately 17,000 feet, at which the difficulty of respiration was very great.

From the Taghdumbash we crossed the Wakh-jir Pass to the watershed of the Oxus and the Wakhan Pamir. The Wakh-jir valley opens out at the extreme westerly end of the Taghdumbash. It has two forks, over the pass that closes the more southerly of which Captain Younghusband made his way with yaks in October, 1891, to the Upper Oxus valley. The right fork is that which leads to the Wakh-jir Pass. This appeared to be the name by which it is known to the Kirghiz; Khujrui, I was told, being the title given to it by the people of Sarhad and Wakhan. The name Wakhjrui, which I see printed upon many maps, I take, therefore, to be a confusion of the two names.* The

* The pass is called Karanchunkar in the report of Mohammed Amin of Yarkand, Adolph Schlagintweit's guide. *Vide* Davies' 'Trade Report of N.W. Frontier,' 1862, Appendix iv. B. This is the same name as Karachukur, the name given by

ascent is gradual, but there is a steep rise in the latter part towards a lake about 1000 yards long by 250 yards broad, which is fed by a small stream at its westerly end, and itself discharges the Wakh-jir tributary to the Danga-bash or Taghdumbash river from its eastern extremity. A short sharp rise conducts to a flat stony plateau which is the summit of the pass. I broke my last remaining thermometer while taking the altitude by boiling-point on the summit. The Russian map gives it as 15,070 feet, M. Dauvergne by aneroid as 15,600 feet, Colonel Woodthorpe by hypsometer as 16,150 feet, the Indian Intelligence map as 17,000 feet, and Lord Dunmore by aneroid as 17,200 feet. All purely aneroid measurements are to be distrusted. My own aneroid, as soon as I got above 13,000 feet, performed the most ridiculous freaks, which their intrinsic absurdity compels me to suppress.

From the top of the Wakh-jir Pass the descent is rather steep and stony towards the Oxus valley, which is visible far down below, a blue line of shingle-bed winding away between lofty ridges crowned with snow, particularly on the south bank. As this is the stream which I believe, and shall here argue to be the true and indisputable source of the Oxus, I will first describe my visit to the actual spot, and will then deploy the line of reasoning by which its claims are sustained. Though the former involves but a divergence of a few miles from the track, and though the glacier or glaciers from which the river springs are visible at the head of the valley, no traveller that I am aware of has taken the trouble to ride up to the place itself. M. Dauvergne, who camped at a little distance in 1889, and who, as Colonel Woodthorpe had already done in 1886, rightly concluded that this was the parent stream, drew a picture of three great glaciers.* They also appear as such in the Russian military map, which coolly calls them the Baron Vrevski glacier, from the name of the present Governor-General of Russian Turkestan. The Indian and English Intelligence maps represent quite a number of parallel glaciers. The only map in which their position and shape are at all accurately rendered is that of the native surveyor who accompanied the mission of Lockhart and Woodthorpe in 1886, but of which there is not a copy in England. I will describe what are the actual facts.

From far above, the main glacier can be seen winding round from the north or left hand to the head of the gorge, in which, however, its point of discharge is not visible. Descending to the shingle-bed, which varies from 100 to 350 yards in width, the channel being divided into

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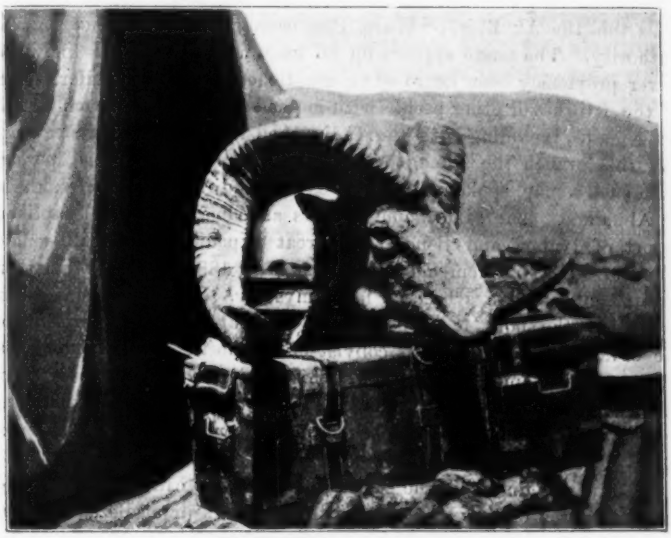
Grombchevski and the Russians to the upper course of the Taghdumbash stream. As applied to a pass, it appears more strictly to belong to a *nullah* leading from the Taghdumbash to the Little Pamir, to the east of the Kukturuk.

* *Vide* his paper published in the Bulletin of the French Geog. Soc. for 1892, and condensed in *Proceedings of the R.G.S.*, vol. xiv., 1892, p. 779, and in the *Scottish Geog. Mag.*, 1892, p. 362. He gave the elevation of his camp as 14,700 feet, and the position as lat. 37° 10', long. 75° E.

several branches of from 6 to 18 inches deep, I rode up it to the source. There the river issues from two ice-caverns in a rushing stream. The cavern on the right has a low overhanging roof, from which the water gushes tumultuously out. The cavern on the left was sufficiently high to admit of my looking into the interior, and within for some distance I could follow the river, which was blocked with great slabs of ice, while there was a ceaseless noise of grinding, crunching, and falling in. Above the ice-caves is the precipitous front wall or broken snout of the glacier, from 60 to 80 feet in height, composed of moraine ice, covered with stones and black dust. I clambered up this to the level of the top



HEAD OF OVIS POLI.

of the moraine, and from there could see the big glacier, with its jagged ice-towers and pinnacles and crevasses coming down from a valley on the left. A lofty mountain crowned with snow blocked up the end of the main valley, and from a *nullah* on the right of this, another ice-field contributed its volume to the main glacier, whose terminal moraine was jammed up and contracted in the narrow outlet of the two valleys. The source of the river is, therefore, not in three great glaciers, but in one great glacier, to which smaller glaciers contribute. At a short distance below the source, a small but incomplete glacier comes to the edge of the cliff on the southern bank, and no doubt frequently adds to the volume of the stream. When I saw it, no water was issuing from its base. When Captain Younghusband, in 1891, crossed over the more southerly

fork of the Wakh-jir Pass, as before mentioned, and was on the Oxus slope of the watershed, he came upon a small lake, from which issued a tricklet of water.* This, no doubt, was one of the feeders of the big glacier which I have described.

Now, before I proceed to state why this is the chief source of the Oxus, let me name, in order of their occurrence, the names of all the claimants to the title. The stream whose source I have depicted is called the Wakh-jir, from the pass which I had crossed, and from the west end of which three rills trickle down the mountain-side and fall into its bed a few miles below the glacier. This name erroneously appears as Varjer in Mr. Littledale's paper and map.† Lord Dunmore calls this the Ak Bilis, or White Pass or *col*, but I know not on what authority. The name appears on no map, and, so far as I know, has never previously been heard of or mentioned by any traveller. None of the Kirghiz or other people with me had ever heard of such a title. Some maps, including both the Indian and English Intelligence maps, call this branch the Aimagon or Almaghan; and M. Capus, perhaps from such a map, spoke of the pass as the Akdjir (obviously Wakh-jir) or Almaiane. The same name appears as Almagan in the published report of Ivanoff and Benderski's great expedition in 1883, and as Almayan-saya in Grombchevski's report in 1889. What this word may mean has always been to me a mystery. I could gather nothing about it on the spot. It has been suggested that it may have arisen from the blunder of some careless copyist or compositor, who mistook the letters of the name Ab-i-Wakhan, which the river undoubtedly bears lower down. M. Capus also mentions the name Ab-i-Chipri, but this again is quite without confirmation, unless, perhaps, it be a perversion of Ab-i-Chap, *i.e.* the left-hand stream.

The next claimant is the stream, perhaps best called the Sarhad or Little Pamir stream, which flows into the Wakh-jir at Bozai Gumbaz, about 25 miles below the glacier source, and which itself rises in the low *col* or plateau that lies at the south-westerly end of Lake Chakmak, on the Little Pamir. It was first introduced to English knowledge by Major Montgomerie's Mirza in 1868–9, who, however, erroneously reported that it flowed out of the west end of Chakmak Lake. This stream, from its start to its junction with the main river, has a course of less than 10 miles, and is narrow, shallow, and quite without significance. It would be unworthy of mention in this context had not some travellers, such as M. Capus, regarded it as one of the parent streams, and had not the claim been also put forward to Lord Dunmore by some of the Russian officers whom he met. There is not a single argument in its favour. In the Russian map, the river or its valley figures, I know not why, as Kuntei-sai.

* Vide *Proceedings of the R.G.S.*, vol. xiv., 1892, p. 231.

† Ibid., January, 1892.

Third in order as we descend the main river, which below Bozai Gumbaz is variously called Wakhan-su, Wakhan-daria, Ab-i-Wakhan, and the Sarhad river, we come to the branch that flows in, also on the right bank, from the Great Pamir, where it rises in Wood's or Victoria Lake. This is the river which was assumed by Wood, and by every one else in consequence of his discovery in 1838, to be the true parent stream of the Oxus, a mistake which, though natural enough on his part, it has taken fifty years to rectify, and which has given rise to at least one-half of the political confusion and diplomatic controversy arising out of the Boundary Agreement concluded by Lord Granville with Russia in 1872–3. The geographical basis of that agreement was the assumption that this branch was the head stream of the Oxus; and when it was found out not to be so, it is not surprising that great uncertainty and confusion should have ensued. This river is commonly marked on maps as the Pamir river, although the title Panja or Ab-i-Panj, which the main stream commonly bears below Kila Panja, is by some applied also to this upper branch. Neither in length, volume, nor any of the requisite characteristics, can it base any claim to be really accounted the parent stream, and we may therefore dismiss it from consideration.

It is not till a point some 160 miles below the confluence at Kala Panja, after the main river, now known indisputably as the Panja or Ab-i-panj, has made the great bend to the north at Ishkashim, after it has received from the east the united streams of the Shakh and Ghund Daras, after it has passed on its left bank Kala Bar Panja, the capital of Shighnan, and is approaching Kala Wamar, the capital of Roshan, on its right bank,—that there comes in from the east the only confluent that can attempt to seriously dispute the validity of the Panja's title. This is the river which, known above its confluence as Bartang (*i.e.* "narrow passage"), higher up as Murghab (*i.e.* "water-fowl"), and higher again as Aksu, originally emerges from the eastern end of Lake Chakmak on the Little Pamir, and throws a great loop round the middle Pamirs on the north, just as the Panja similarly encircles them on the south. The claim of the Murghab or Aksu to be the parent stream — first suggested some thirty years ago by the Russian geographer Veniukoff, and temporarily entertained, on political, perhaps, rather than on geographical grounds, by Sir H. Rawlinson and some other writers—has from time to time been revived, and has found favour with some who were unacquainted with the full geographical details. Although this hypothesis is not, I believe, now entertained by any one who can pretend to such knowledge, it may be well to state the reasons for which it cannot possibly be accepted.

The arguments which have been used in its support are as follows. Firstly, it has been suggested that the Greek name Oxus, by which the river in and above Bactria has been known since the days of Alexander,

is a corruption of the Turkish name Ak-su (*i. e.* "white water") by which the Murghab is known in its upper course. Secondly, it has been stated that the entire length of the Aksu-Murghab-Bartang is greater than that of the Panja. And, thirdly, it has been suggested that it receives a larger number of confluents in its passage. None of these contentions, however, can be established.

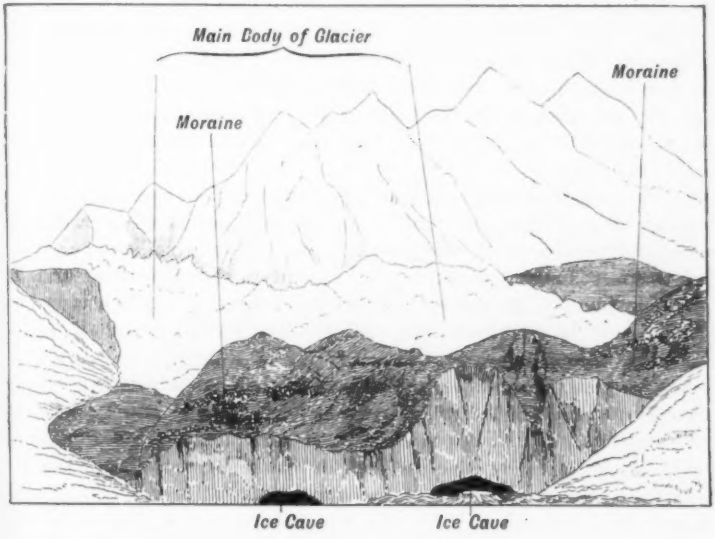
The theory that Oxus is merely a Greek transliteration of Aksu, is one of those purely fanciful identifications to which amateur etymology is particularly prone. In the first place, Aksu is the name only of a limited, and that the most insignificant, section of the Murghab or Bartang river, of whose existence it is scarcely possible that the Greeks can ever have been aware. When they came to Bactria, and asked the name of the great river, it is in the highest degree unlikely that the inhabitants would have given to them the name of a remote stream many hundred miles distant, of which not one of themselves had probably even so much as heard. Secondly, as a Turkish name, it is doubtful whether the name Aksu can have sprung into existence until long after the Hellenic form Oxus had been coined. Thirdly, that the name Oxus was the Greek transcription of some very early form appears to be certain. As to what this may have been authorities differ. Sir H. Rawlinson regarded it as the Hellenic version of Wakhsh, the name of the principal northern confluent of the great river, which, under the modern Persian title of Surkh-ab (identical with Kizil-su, or Red river), flows into it from the direction of the Alai, between Karategin and Darwaz, while he regarded the Persian form Wakhsh as identical with the Vakhshu of Sanskrit literature, which, in the Puranas, and in the traditions and travels of the early Buddhist pilgrims, is described as third of the four rivers of the Aryan paradise; and, with the Mongolian Bakhshu, the Tibetan Pakshu, and the Chinese Fotsu, all of them being names given to the same river—*i. e.* the Oxus—from very remote times. What may have been the original root of the Sanskrit Vakhshu is uncertain. *Vah* ("pure"), *vah* ("to flow"), and *vaksh* ("angry"), have been suggested. They may have been strengthened into it, or it may have been contracted into them.* With reference to his suggestion, I may observe that it appears to me unlikely that the Greeks would have named the main river from what was obviously only a tributary, even though a considerable tributary, in a part of its course with which they must have been perfectly familiar, and far above which they were thoroughly acquainted with the main stream.

Sir H. Yule sought the origin of the name in the same Sanskrit root, *veh* or *vah*, which he regarded as appearing in the various forms Wakh-an and Wakhsh, from the former of which he supposed the Ochus,

* *Vide* Sir H. Rawlinson's 'Monograph on the Oxus,' in the *Journal of the R.G.S.*, vol. xlii., 1872, pp. 489, 496, 501.

mentioned as a Central Asian river in Strabo and Pliny, to have been derived, and from the later Oxus, Oxii, Oxiani.*

Professor Vambéry, however, scouts these derivations, and says that Oxus was merely the Hellenized form of Oghuz or Okhuz, which was the old Turkish denomination of a big water or river. He cites the Sheibani-nameh, written at the end of the fifteenth century, where the Oxus is often called Oghuz, and he says that the Uz-boi or Turkoman name for the ancient bed of the same river existing in the desert south of Khiva, is a contraction of the same title. It seems to me, however, most unlikely that Turkish names should have prevailed in Bactria and Sogdiana at the time of Alexander, before the Turks had been so much



GLACIER SOURCE OF THE OXUS.

as heard of; and it is noteworthy that in all the Mussulman chronicles and geographers, from the first appearance of the Arab conquerors in those regions, the name applied to the river is not Oxus, but Jaihun. If Oghuz was, and had been, its admitted title for centuries, why is it always designated by another?

To me it appears more likely that the Greeks of Alexander's day should have heard a Tajik or Iranian name, *i.e.* a word of Aryan descent;

* *Vide* Introduction to Wood's 'Oxus,' p. xxiii. He thinks, with plausibility, that the first of these forms reappears in the name Oech—undoubtedly the River Oxus—to which the Byzantine ambassadors from the Emperor Justinian to Dizabulus, Khan of the Turks, in 568 A.D., came on their return journey to Europe (*Ibid.*, p. xlii).

and whether this now unknown word was allied or not to the root-forms cited by Rawlinson and Yule, it may conceivably in its origin have sprung from that primordial form signifying water, which is variously supposed to reappear in the Latin *aqua*, French *Aix*, Erse *uisge*, Gaelic *usque*-baugh, English *whisky*, and in the river names Usk, Axe, Exe, Esk, Ox-ford, and Ouse.

The second argument in favour of the Aksu-Murghab is its alleged superiority of length. The Russians say that from its source in the Chakmak Lake to Kala Wamar it is 252 miles in length; while the Panja from the glacier-source to the same point has been roughly estimated as 240 miles. I do not myself regard the test of mileage, particularly when the figures are so evenly balanced, as of any conclusive value. But I may say, from a double calculation of compass-reckoning, and ascertained length of marches, that I believe the course of the Panja to Kala Wamar to be not 240 but 270 miles, or nearly 20 miles in excess of the asserted length of the Aksu. So that even on the score of length the advantage is not, as claimed, to the Aksu, but to the Panja.

The third argument, viz. that the Aksu-Murghab receives a larger number of tributaries, can, of course, only mean that it contains a larger volume of water. Now, it is obvious that the sole method of applying this test is not by counting upon the fingers the respective number of confluents, but by measurement of the volume of the two streams at the point of junction. Not one of the advocates of the Aksu-Murghab theory, however, has ever visited Kala Wamar. On the other hand, Mr. Ney Elias, the only Englishman who has ever been there (in November, 1885), has recorded that from careful inspection and personal fording of both rivers, and from minute local inquiries as to their respective fluctuations, he was able to satisfy himself that the Panja is, at every season of the year but one, a very much more voluminous stream than the Murghab. That exception is in the summer months of June and July, when, owing to the much greater proximity of the main glacier feeders of the Murghab (viz. the Kashala Yakh at the head of the Kudara tributary, south-west of the Great Kara Kul) and to its more compressed channel and steeper bed (involving a greater fall per mile) between the Kudara junction and Kala Wamar, there is probably more water in the Murghab at the latter place than in the Panja; a view which was borne out by the native surveyor, despatched by Colonel Trotter, of the Forsyth Commission, to this spot in June, 1873. He reported that both the volume and velocity of the Murghab were greater at that season, but he made no attempt to ascertain their relative depth. As soon as this brief spate, due to the summer melting of the glacier surfaces, is over, the Murghab dwindles rapidly, and when Mr. Ney Elias saw it in the season of low water in 1885, it had somewhat less than half the volume of the Panja. He

summed up by saying that of the three elements of which a river consists—breadth, velocity, and depth—the first is greater in the Murghab in summer and in the Panja in winter; the second is always greater in the Murghab; but the third, and most important, is always greater in the Panja; whilst, roughly speaking, the duration of winter to summer is as three to one.

I hope, therefore, I have shown incontestably that, upon each of the grounds put forward by the advocates of the Aksu-Murghab theory, their case breaks down. I may add that there are certain subsidiary criteria of the headwaters of a river, the application of which will be attended in each case with precisely the same result. If elevation of source be considered, then the Panja is easily the superior; for whereas the height of Lake Chakmak was registered by Colonel Trotter as 13,200 feet, by Captain Younghusband as 13,850 feet, and by the Boundary Commission of 1895 as 13,100 feet, that of the glacier source of the Wakhjir was given by M. Dauvergne as 14,700 feet. If, on the other hand, total drainage area be taken into account, though, in the absence of more accurate surveys than we at present possess, I hesitate to dogmatize, yet a glance at the map will show that, to all appearances, the advantage is greatly on the side of the Panja.

There remain two other arguments, one based upon physical, the other upon historical grounds, which should not be without weight. To some extent the structure of a valley containing a river may be said to bear upon the question of its identity. That any one who had followed up the valley of the Panja to Kala Panja in the first place, or to Bozai Gumbaz in the second, and had at either of those places seen the main valley, with no physical interruption, continuing to pierce the mountains, should ever have entertained any doubt as to its containing the principal stream, seems to me very strange.*

* And yet an almost unbroken succession of travellers and authorities, from Wood downwards, have been guilty of the error. Wood himself had serious qualms; for when he came to the junction above Kala Panja, and had to make up his mind which branch to pursue—whether the Pamir confluent from Victoria Lake, or the Sirhad or Mastuj branch, as he called the Ab-i-Wakhan, from a mistaken idea that it somehow conducted into Mastuj and Chitral—he said, "To my eye the stream of Sirhad, as the river from Mastuch is frequently called, appeared the larger, but the Wakhanis held a different opinion." Had he followed his eye instead of his guides, the true source of the Oxus might have been determined half a century earlier, and the two governments of Great Britain and Russia might have been spared the long controversy over the ignorant agreement. Yule, following Wood, expressed some doubts as to whether the Pamir or the Sarhad were the real parent stream; but writing as late as 1872, he entertained not the slightest suspicion of the existence of the real Wakhan source (which is not even indicated in his map to the new edition of Wood in that year), but accepted the account of Major Montgomerie's Mirza in 1869, who said that the Sarhad branch rose in the Little Pamir or Chakmak Lake. More remarkable is it, that even after the falsity of the latter hypothesis had been discovered, the subsequent travellers who came to Bozai Gumbaz, at the junction of the Sarhad and the Wakhjir stream,

The final argument is that of historical authority and popular acceptance. In the first place, it is noteworthy that, from as far back as records extend, the identity of the river below Kala Wamar with the Panja (and not with the Murghab) above has been assumed by the inhabitants of the district, indicating that, in their opinion, this was the parent stream. Like the Greek Oxus, so the Persian name Panja is applied to the river both below and above Kala Wamar—in fact, over the whole distance from Kala Panja to Kolab. Secondly, if we consult the best-known Arab geographers—nay, even if we come down to the present century, and study the writings of a countryman of our own—we shall discover indications of the real truth so unmistakable that it is surprising they should have been so completely overlooked. It is a common consensus among the Arab writers that the Jaihun, as they uniformly call it, rises in or near to Badakshan, a description which can only refer to the southern or Wakhan branch, and not possibly to the Murghab or Aksu. Istakhri, however, who wrote in the tenth century, was even more precise. "The Jaihun rises under the name of Jariab (or Khariab) in the land of Wakhan, which belongs to Badakshan. In Khotl and Wakhsh it receives several tributaries, which swell it to a great river. The first of these is called Akhas or Halbak; the next is the river Bartang; the third is the river Faraghi; the fourth is the river Andijara; the fifth is the Wakhshab, which is the greatest of all these rivers." Edrisi, in the twelfth century, almost textually reproduced this description, which, however we may identify the remaining four confluents, at any rate expressly includes the Bartang or Murghab among their number. Finally, if it be said that in none of these accounts is the precise source indicated, but only the more southerly or Panja branch, let me cite a memoir by Lieutenant Macartney, printed as an appendix to Mountstuart Elphinstone's "Kingdom of Caubul" (published in 1815), in which, quoting from some native informant whose name is not given, he supplies an almost absolutely correct description of the Wakh-jir source, as I have already depicted it, and concludes, with a prescience which for seventy years only one person was found to imitate, and none to detect, that it was the true parent stream. These are his words:

"The river Ammu, or Oxus, has its source from the high lands of Pamer. It issues from a narrow valley 200 or 300 yards broad in Wakhan, the southern boundary of Pamer. This valley is enclosed on three sides by the high snowy

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should have all but ignored the latter. Gordon in 1874, upon arriving at Bozai Gumbaz, merely remarked, "A stream from the eastern Taghdumbash Pamir joins here." Capus, in 1887, said nothing about it at all. Littledale, in 1890, said, "At Bozai Gumbaz another stream joined the Wakhan called Varjer" (*i.e.* Wakh-jir). Had any of these travellers, from Wood downwards, ever read the description of Macartney, which was written in 1809 and published in 1815, and which I shall quote presently, he could hardly have committed such an oversight.

mountain called Pooshtikhur * to the south, east, and west. The stream is seen coming from under the ice, which is stated to be at least 40 spears in depth. The spring itself could not be seen in consequence of the great mass of ice formed over it; but there can be no doubt of the spring's being on this hill under the ice, for it does not appear that there was any opening or break in any of the three sides mentioned, by which it could come from a more distant place. I therefore conclude that this is the true head of the Oxus; at all events the greatest body of water, though there are others which may have a more distant source. It is carried north † in this narrow valley for 5 *coss*; ‡ at 4 *coss* it is 20 yards broad, and breast deep; and on leaving the valley, after having been joined by many other springs from the same hill, it is 50 yards, and middle deep. The Shiber, or Adum Koosh,§ joins it 5 *coss* above Kilia Shah Jehan,‖ 25 *coss* below Pooshtikhur. In this distance seven or eight streams, from knee to middle deep, and from 10 to 30 yards broad, join it from the left bank." ¶

I submit that Lieutenant Macartney's native informant, whoever he may have been, was a better-informed and a more competent geographer than the host of big names who have succeeded him, and I gladly disinter this forgotten passage, in order to lay a tardy wreath upon its author's grave. I am the more ready to offer this compliment, since the only competitor for its award, in the person of the single follower to whom I have alluded, was also a native. Mohammed Amin of Yarkand, the guide of the murdered Adolph Schlagintweit, supplied to Pundit Manphul a geographical description of Chinese Turkestan and the neighbouring regions, to the accuracy of which modern geographical research lends ever-increasing testimony. In this report, which is printed as an appendix to Davies' 'Trade Report of the N.W. Frontier,' in 1862, occurs a passage which I have never seen quoted, but which, though fifty years later than Macartney, must share with him the credit of perfectly faithful presentment. He says, "Another stream from the Pamer Khurd lake (*i.e.* the Sarhad stream from Lake Chakmak) falls into *the headwaters of the Daria-i-Panj* near Karwan balasi ** (*i.e.* at

* Pusht-i-Khur means literally, "Ass's Back," presumably from the shape of some crest or summit of the mountain. Major Raverty ('Notes on Afghanistan,' p. 160) thinks this is a fictitious title, which he supposes to have arisen from a confusion with the Bushkar Darah, a valley on the western border of Chitral, over 150 miles away. At the same time (p. 302) he accuses Macartney of having confounded the glacier source of the Oxus with the glacier source of the Yarkhun or Chitral river, whereas Macartney was quite right in distinguishing the sources of the two rivers as rising on opposite sides of the central Hindu Kush watershed.

† The real direction is north-west.

‡ A *coss*, or *kos*, varies from 1 mile 4 furlongs to 1 mile 6 furlongs. It is the Hindu equivalent of the *kuroh*, also a term of variable quantity, which prevails in Afghanistan.

§ This is clearly the Sarhad, or Little Pamir confluent. The distance as given is almost exactly correct.

‖ This must have been one of the forts whose ruins are still visible below Bozai Gumbaz.

¶ This also is correct.

** Karwan or Caravan balasi is a name still applied to a piece of good grazing-ground on the right bank of the Oxus, opposite to the junction of the Baikara stream.

Bozai Gumbaz), *which have their source on the western side of the Karachunkur pass* in the Pamer range (*i.e.* the Wakhjir Pass), below the Piryakh peak in the Karakoram range." * The Piryakh peak is, apparently, that which is elsewhere called Pirkhar,† and was described by Macartney as Pusht-i-Khur. Had the scientific geographers who made the careful Yarkandi's report the basis of speculations as ingenious as they were mistaken, only paid attention to his written words, again might the discovery of the true source of the Oxus have been anticipated by thirty years.

It is worthy of mention, and was pointed out to me by the late General J. T. Walker, that the source of the Oxus, thus described, does not spring from the higher range of the Hindu Kush. It is a well-known fact that most of the principal rivers of the Himalayas do not rise in those ranges, but in the country behind them to the north, afterwards breaking through them on their way to the south. Thus their sources are really several thousand feet lower than the sources of the smaller rivers which rise in the southern fall of the Himalayas. The same phenomenon also occurs in the Hindu Kush. The Hunza river rises considerably to the north of the anial range of the Hindu Kush, and breaks through on its way to the south. Thus the water-parting is thrown considerably to the north, and is very much lower than the anial range. It is on the reverse side of this water-parting that the Oxus has its source.

(*To be continued.*)

ADMIRALTY SURVEYS DURING THE YEAR 1895.

UNDER the orders of the Lords Commissioners of the Admiralty, hydrographical surveys have been in progress on the shores of the United Kingdom, the west coast of Newfoundland, Mediterranean, west coast of Africa, east coast of North America, Bermuda, Australia, Solomon and Tonga islands, and the Fiji group.

These surveys have been carried on by seven steam-vessels of war and three small hired steam-vessels, manned by 69 officers and 676 men.

Naval officers have also been employed, with the sanction of the Admiralty, under the Indian Government. The results of their labours are also mentioned herein.

A detailed report of the labours performed by each surveying vessel has been prepared, and, in accordance with custom, has been presented to Parliament. The following is a brief summary:—

Reports of the discovery of rocks and shoals are still very numerous; during the past year no less than 199 of these dangers to navigation were reported to the Hydrographic Department, and notified to the public by Notices to Mariners.

On the shores of the United Kingdom, a large area around the Shetland islands,

* p. cccxxxiii.

† Pirkhar is a name now applied to the valley and stream that open out on the left bank of the Oxus, immediately opposite to and south of Sarhad, and up which the road goes to the Baroghil Pass. Piryakh or Piriokh, on the other hand, is the name of a range of mountains on the 39th parallel between Karategin and Darwaz.

where the soundings had been left incomplete for many years, was taken in hand and completed; Bressay sound was thoroughly surveyed, and a commencement made in the survey of Kirkwall and its approaches.

Along the East Coast, a re-survey was made of the great line of sandbanks which stretches along the shores of Norfolk and Suffolk, and rendered necessary by their constant movement. The changes which this survey revealed are great, and it is difficult to recognize the banks as now depicted when compared with the last survey of 1885. The most important feature is that, while the anchorage ground in Yarmouth Roads is somewhat narrowed by the closing of the banks on the shore, there is more protection to vessels, due to the banks being much higher than before. Plans were also made of Lowestoft harbour and the entrance to Yarmouth haven.

In the estuary of the Thames, Sea reach was resounded, the result showing generally that this part of the river is in a more favourable condition for navigation than when last sounded in 1883. Farther up the river, Lower Hope reach and Gravesend reach were also re-surveyed.

Portland harbour was re-sounded on a large scale, and the result of this work was very satisfactory, as it proved that in this very important harbour of refuge there has been absolutely no silting during the last twenty-five years.

At Plymouth, various areas in the Sound, Cattewater, and Hamoaze, where dredgers had been working since the close of last season's work, were closely examined to ascertain if any shoal heads had been left.

In Milford Haven, the southern shore from the dockyard to the westward of Angle point, including the narrows south of Weare point, was re-sounded on a large scale. Holyhead harbour was also re-surveyed, and the soundings between Menai Strait and Little Orme's Head resumed in continuation of the work of the previous season.

In Bantry and Tralee bays, re-surveys were made of parts that required amendment.

On foreign and colonial shores—on the west coast of Newfoundland the survey was continued from the point at which it had been discontinued the previous year, and completed from Bluff head at the entrance to Port-au-Port across the Bay of Islands to the northern side of Bonne bay, a distance of about 57 miles, the soundings being carried out to a distance of from 8 to 10 miles from the land. Bonne bay was also surveyed on a somewhat larger scale, and plans made of some of the anchorages.

In the Mediterranean, the anchorage waters on the west side of the rock of Gibraltar were re-sounded on a large scale, in order that the breakwaters now in contemplation might be so planned as to include the greatest available anchorage space.

The survey of Port Argostoli, in Cephalonia, which had been commenced in 1894, was completed, and a detailed survey of the Gulf of Corinth commenced.

On the west coast of Africa, a survey was made of the approaches and entrance to the Sherbro' river, and completed up to Bonthe, the residence of the commissioner of the district. This thorough survey was rendered necessary to meet the requirements of largely increasing trade.

At Bermuda, the Crawl and Bailey flats were re-sounded, and an exhaustive examination of the Narrows commenced and nearly completed.

Numerous reports tend to show that the off-shore soundings off the coast of Nova Scotia, in the approach to Halifax, as at present shown on the charts, are unreliable. Accurate soundings are especially required here to assist vessels in determining their positions during the fogs which are so prevalent on this coast. Work was commenced in this area, and about 1900 square miles sounded out on a scale of half an inch to the mile.

In the South Pacific, the survey in progress among the Solomon islands was continued along the north coast of New Georgia, and a plan was also made of Gavutu harbour, Florida island. Lines of soundings were also obtained between this group of islands and the Queensland coast.

Among the Tonga islands, a survey was made of the Namuka group, and a plan of Lifuka anchorage, Hapai group, was completed; the relative positions of the majority of the islands forming the latter group were also determined.

In the Fiji islands, the intricate coral waters off the north coast of Vanua Levu, from Mathuata island to Mount Thuku near the eastern extremity, were surveyed in the interests of growing trade; a triangulation was also completed of the unsurveyed part of the north coast of Viti Levu, ready for continuing the survey in 1896.

Several of the surveying vessels were employed in obtaining lines of deep-sea soundings in the south-west Pacific, some of which were obtained with a view of the possible laying of a Trans-Pacific submarine telegraph cable. From Sydney two lines were taken across to New Zealand, and from Auckland a line of soundings was run to the Tonga group. From Tongatábu another line was carried to Suva, Fiji, and from thence to Upolu, Samoan group. On this passage an unsuccessful search was made for the Zephyr shoal, but a bank with 11 fathoms over it was discovered about 20 miles east-north-east of the position assigned to it.

A visit was paid to Niuafóu, and a party of officers landed for the day to examine and report on this interesting island, the central part of which is occupied by a large and deep lagoon, some 90 feet above the level of the sea, with a ring of high fertile land sloping on all sides to the sea.

From Upolu the line of soundings was continued to Vavua and Falcon islands, and from thence to Tongatábu.

Falcon island, which is entirely of volcanic origin, was found to have altered considerably since last reported on, and is now only 40 feet high, and about 700 yards in diameter; it is composed of light cinders and ashes, with no abnormal heat in the ground. This examination disproved the report that this island had been washed to the level of the sea and then raised again, as some coconuts, planted by a Tongan chief shortly after the island was first upraised in 1885, were found growing.

Proceeding to the southward, another line of soundings was taken from the Tonga group to New Zealand, passing to the eastward of the Kermadec islands. Very deep water was found on this line, no less than three soundings exceeding 5000 fathoms. The first of these, 5022 fathoms, is in latitude 23° 39′ 4″ S., longitude 175° 4′ 2″ W. The other two soundings in 5147 and 5155 fathoms, red clay, were obtained in latitude 28° 44′ 4″ S., longitude 176° 4′ W.; and latitude 30° 27′ 7″ S., longitude 176° 39′ W. respectively. Good specimens of the bottom were brought up on both these occasions.

These deep soundings are remarkable, as they are deeper by 500 fathoms, or half a mile, than anything before obtained. The deepest place in the ocean before known is to the north-east of Japan, where, in 1875, the United States s. *Tuscarora*, found 4655 fathoms. They also show the great inequalities of depth that exist in the Pacific Ocean, as the deep soundings now obtained are all separated from one another by shallower ridges. They furthermore confirm the fact, before observed, that the deepest parts of the sea are not far from land.

Another series of deep sea-soundings was obtained from the North Cape, New Zealand, to Suva, and from thence to the north-east of the Fiji group for 400 miles towards the Phœnix islands, and back to Fiji. The Isabella bank, lying 90 miles to the north-west of Wallis island, was examined, and two other banks of

considerable extent, of sunken atoll character with a least depth of 12 fathoms over their rims, were discovered in the same vicinity.

From the Fiji group deep sea-soundings were obtained every 50 miles to Norfolk island, and from thence to Cape Byron on the Australian coast.

The detailed survey of the Inner route along the Queensland coast, inside the Great Barrier reef, was continued, and completed from Chapman island, near Cape Direction, to Night island.

In India, the survey of Palk strait, north of Ceylon, was continued and completed as far to the westward as Delft island. This survey demonstrated that no passage exists across the banks that skirt the northern shores of Ceylon deep enough for heavy-draught vessels to approach the passage leading to Adam's Bridge during the north-east monsoon in safety.

On the west coast, the survey in the vicinity of the mouths of the Indus was taken up at the Hajamro mouth, and completed to the southward and eastward as far as Kori river, off which the soundings were carried out to from 15 to 20 miles from the coast. Considerable alterations were found to have taken place since the last survey.

During the year the Hydrographic Department has published 114 new charts and plans, and improved 34 charts by the addition of 43 new plans; while 5463 corrections have been made to the chart plates. The number of charts printed for the requirements of the Royal navy, for Government Departments, and to meet the demand of the general public has, during 1895, amounted to 312,638.

THE INDIAN SURVEYS, 1894–95.

By C. E. D. BLACK.

THE aggregate area on all scales surveyed during the year by the various parties of this department amounted to 125,384 square miles, and the operations consisted, as usual, of triangulation, topography, forest surveys, cadastral surveys, traverse surveys, electro-telegraphic determinations of longitude, tidal observations and spirit-levelling, geographical surveys, and the normal work of the headquarters' offices.

The trigonometrical operations were rather interesting, as they consisted in part of measures for connecting the old Cachar triangles, which were left uncompleted in 1862, owing to the wildness of the country eastward, with the most northerly points of the new Mandalay series. This involved carrying the survey across the mountains east and west of Manipur, where the connecting series will consequently bear the name of the Manipur Longitudinal Series. The country proved exceedingly difficult to work in, owing to dense jungle, the want of suitable hills for Grand Trigonometrical stations, and the almost entire absence of villages. But unattractive though it may be, the region is one of importance, lying as it does intermediately between Cachar and Manipur on the one hand, and the Chindwin and Irawady valleys and the town of Bhamo on the other. The general opinion seems to be that the most feasible route for railway communication between Assam and Burma is further north, by way of the Patkoi pass; but nevertheless

the line taken by the present triangulation may prove of some commercial use in the future, and it is a pity we are not told more about it in this report. Surveyors often penetrate into regions closed to other people, and the narratives of the members of the Indian Survey Department have contained so much useful statistical and general information in the past, that we regret they should have been so trenchantly cut down on the present occasion. There is, however, a brief extract dealing with the other portion of the trigonometrical work, which consisted of fixing the positions of beacons along the Sind coast between Karachi and Kuch. The tract is designed by Mr. Prunty as an inhospitable waste of sea-water and pestilential mangrove swamp. Supplies were very difficult to procure, and sickness and fever were so rife, that had it not been for large daily doses of quinine not a man would have been fit for duty. It is satisfactory, therefore, to learn that this gruesome piece of work has at last been brought to a conclusion.

With regard to topography, a total area of 21,588 square miles was surveyed, the bulk of this out-turn being on the $\frac{1}{4}$-inch scale. It is noticeable that the surveys in Upper Burma, previously classed as geographical, are now assigned a more appropriate place in the topographical section. Captain Renny-Tailyour rendered a fair out-turn of work in a mountainous tract of the Shan States north-west of Fort Stedman. In Baluchistan, Colonel Holdich's party was divided into nine detachments, three of which were detached for service with the Afghan Boundary Commission. The Asmar section, under Colonel Holdich himself, accompanied by Lieutenant Coldstream and three surveyors, mapped about 1200 square miles in the Kunar and Asmar valleys; the Baluch-Afghan section, under Captain Mackenzie, with five surveyors, continued its work throughout the winter; and the Kurram section, under Lieutenant Macaulay, completed its work by the end of December, 1894. Unfortunately, Lieutenant Macaulay, who during the progress of the operations had been ordered to join the Waziristan Delimitation Commission, was killed in the fight which occurred at Wano on November 3, 1894. In Southern Persia, between Bandar Abbas and Jask, about 19,000 square miles of new country were mapped on the $\frac{1}{8}$-inch scale; and Jamaluddin surveyed the summit of the Ginas range, a plateau-like expanse which stands about 6000 feet above sea-level, and would answer admirably for a sanitarium in this exceptionally trying region. Yusuf Sharif was also successful in connecting the different triangulations executed during previous seasons at Charbar, Jask, and Bandar Abbas, and the whole of this work now forms a continuous series from Charbar to Jask. Khan Bahadur Imam Sharif, as our readers are aware, again accompanied Mr. Theodore Bent on an exploring tour in the Hadramaut country of Southern Arabia, where he managed to map about 3000 square miles in the Dhofar district. Another native surveyor, Sheik Mohiuddin, distinguished himself, not

for the first time, in mapping out 40,000 square miles in Western Baluchistan and Persia, and in revising about 5000 square miles of imperfectly surveyed ground in the neighbourhood of Kharan. For his various services he has been awarded the title of Khan Bahadur. A special examination of the Baluch triangulation in its entirety has been made by the Surveyor-General of India, and the conclusion arrived at is that it sorely needs a more reliable foundation, so as to admit of the detached portions being tied together on a firm basis. Early attention will be given to this requirement, and a first-class series is to be commenced this year, and carried through Mekran into Persia, by which means correct bases will be furnished for all Southern Baluchistan. In Upper Burma, Major F. B. Longe's party (No. 21) continued the 1-inch topographical survey of the Southern Shan States, and completed the geographical ¼-inch survey of the Northern Shan States and the Upper Chindwin district. A native surveyor carried out, in concert with some Siamese commissioners, a good portion of the boundary survey between Amherst and Siam, while Major Longe himself and assistants accomplished a survey of the Kokang State, which was to be ceded to China under the Anglo-Chinese convention.

Passing by the electro-telegraphic determinations of the difference of longitude between Karachi and Greenwich, which were reviewed a few months ago in this *Journal*, we note that tidal observations for the compilation of tide-tables for navigation were carried on at thirteen stations on the coasts of India, and at Trincomali, Minicoy, Port Blair, Bushire, Maskat, and Aden. Spirit-levelling operations were also extended in various directions, especially along the east coast to Vizagapatam, where a junction was effected with the previous series brought up from the south in 1888, and the entire chain of levels between the tidal stations along the western shore of the Bay of Bengal are thus linked together.

A survey detachment was organized to accompany the Anglo-French mission of inquiry into the feasibility and limits of the proposed buffer state on the Mekong river. Colonel R. G. Woodthorpe, C.B., was in charge of the party, and Lieutenant Ryder, Mr. J. G. Scott, C.I.E., and Mr. G. C. Sterling were also attached thereto. Most of the French officers were met on January 1, 1895, and by the end of April the whole of the buffer state was covered with triangulated points, connected with those laid down in the previous season, while others were thrown out to the north and north-east, beyond Keng-Hung—an extension of the triangulation which will no doubt prove useful in the future. A very satisfactory junction was also made with Mr. McCarthy's elaborate triangulation in Siam. No special fair map is being prepared to illustrate the labours of the mission, but the results are being incorporated into the two sheets, 13 N.W. and 13 S.W., of the Burma Geographical Survey.

The very interesting operations of the Pamir Boundary Delimitation Commission have been already briefly referred to in these pages. Colonel Holdich and Major Wahab were the principal moving spirits in the survey, and they successfully achieved the objects sought in making topographical maps of the country adjoining the boundary, so as to assist the Commissioners in defining it, and in effecting such a junction with the Russian survey system as to ensure a common basis for the mapping on both sides. The weather was most inclement and unfavourable, but at last a sudden and fortunate break put an unexpected end to the difficulties. From a commanding peak near the Benderski pass Major Wahab obtained a magnificent view of the whole line of the Himalayas to the south, while at the same time he was enabled to gain a panoramic view northward to the Sarikul and Trans-Alai ranges, which stand within view of Osh in Ferghana. On two subsequent occasions he was equally fortunate, and it is certain thus that the basis of the geodetic measurements is sound and reliable. While Major Wahab carried on the triangulation, the topography was managed by Khan Sahib Abdul Ghafur with praiseworthy determination. His difficulties were largely due to the nature of the ranges which intersect the Pamirs and their approaches, partitioning the country into narrow valleys at most a mile or two wide, while they themselves form broad intervening flat-backed ridges of width varying from 10 to 30 miles, with a watershed obscured and well-nigh lost amidst eternal snows and glaciers, offering no marked and distinct peaks for recognition. The general results were found to be in close agreement, the difference in latitude being 20″ at the starting point and 10″ at the closing point, and in longitude only 4″ and 6″ respectively. As regards altitude also the difference was remarkably slight. Altogether about forty well-marked points and peaks have been fixed by triangulation, which will serve for junction with the Russian system. The area surveyed in detail on the $\frac{1}{4}$-inch scale amounted to about 4800 square miles, and about 250 square miles were specially surveyed on the $\frac{1}{2}$-inch scale to illustrate doubtful or disputed points.

In April, 1895, a small detachment was organized under Captain W. J. Bythell, R.E., to accompany the Chitral relief force. Large scale plans of the Malakand and Khar camps were made, and from the latter place Captain Bythell, assisted by Hira Singh, carried a $\frac{1}{4}$-inch detail survey through Dir, which was continued as a theodolite traverse from the Laorai pass to Chitral. Early in August Captain Bythell continued the traverse along the Arnawai nullah, but was obliged to abandon it owing to the difficult nature of the country. The results of the reconnaissance were—

(1) Continuation of the Chitral river traverse from Mirkanni to Arnawai, thus completing an unbroken traverse from Mirkanni to Arnawai.

(2) An accurate traverse of the Arnawai nullah from 9½ miles from its junction with the Chitral river; and

(3) Fairly accurate fixings of the following villages:—Arnawai, Lambabat, and Mirkanni on the Chitral river, Damer or Gud in the Gud Gol, and Ramram and Kamsai in the Arnawai stream. Also fixings of points on the Bashgol nullah watershed, mouth of Bashgol stream, and of points on both watersheds of the Arnawai stream.

Altogether a considerable topographical knowledge has been gained of some 3600 square miles of hitherto unknown country, and when we are in possession of the detailed maps and reports, light will no doubt be shed on the revision of the Anglo-Afghan boundary agreement which has attracted some attention in this country.

At the headquarters' offices a vast amount of geographical compilation and drawing, engraving and photographic and lithographic work, has been accomplished, the latter branch being under the very efficient superintendence of Colonel Waterhouse. As, however, the maps themselves are duly noticed in this *Journal*, it is perhaps unnecessary to mention them here again. From a British point of view the most important productions are the general maps illustrating whole provinces, such as Burma and Baluchistan; and if new compilations showing the latest surveys in these parts could be made available with greater promptitude, there is no doubt that they would excite considerable interest and command a ready sale in England. The work of actual survey is carried on with an energy that is deserving of all praise, but, so far as English geographers and others interested in India and adjacent countries are concerned, there appears to be a congestion of the material at headquarters which prevents some of the results of these remarkable surveys being utilized as promptly as could be wished.

A notable retirement during the year was that of Colonel Sir H. R. Thuillier, K.C.I.E., R.E., who quitted the department after a long and useful career of thirty-six years, nine of which had been passed as Surveyor-General. The name of Thuillier is one deservedly honoured in the annals of the Indian Survey, and it will be gratifying to our readers to learn that the Government of India have placed specially on record their appreciation of the excellent service rendered by this distinguished son of a distinguished father.

GEOGRAPHY AT THE UNIVERSITIES.

THE following report on geography during the past year at Oxford has been sent by Mr. H. J. Mackinder:—

"During the past academic year I have lectured, as usual, twice a week in each of the three terms. In Michaelmas Term I dealt with

Continental Europe, in Lent Term with Britain, and in the Summer Term with America. The class in the first-mentioned term consisted of 56 undergraduates from 11 colleges, and 3 lady students from 2 halls; in the second term there were 74 men from 10 colleges, and 9 ladies from 4 halls; while the third term produced 21 men from 7 colleges, and one lady.

"Mr. Gunther, the geographical student for 1895, has worked in the Phlegræan Fields of Naples, and will shortly present a report to you.

"In conjunction with Mr. Chisholm and Mr. Dickson, I took part, as usual, in the geographical examinations of the Oxford and Cambridge Joint Board. I also helped Mr. George, of New College, to draft a syllabus in geography for the Oxford Higher Local Examinations.

"The University has recently passed decrees providing for the continuance of the readership after the expiry of the present arrangement with the Society. There will consequently be no break in the continuity of the work initiated by the Society and assisted by it during the past nine years.

"In London, I have delivered at Gresham College a course of twenty lectures on 'The Principles of Geography as illustrated by the Atlantic and Britain.' This course was dependent on the co-operation of your Society and of the London University Extension. The attendance numbered nearly 300, mostly teachers and pupil teachers. At the conclusion, just before Easter, 174 candidates presented themselves for examination, and the examiner, Mr. Chisholm, reported that 16 per cent. merited "distinction," that 48 per cent. obtained half marks or more, and that 12 per cent. failed to pass. Mr. de Burgh gave me much assistance in the supervision of the large number of weekly essays. Since Easter, Dr. Mill has delivered a supplementary course of five lectures at the same place and to the same class.

"During the past winter I have also held a weekly class on economic geography in the rooms of the London Chamber of Commerce. This class was in connection with the London School of Economics and the London Technical Education Board. It was attended by some 20 City men of various ages and callings.

"Once more I must report that several of my students, both at Oxford and in London, have urged the importance of establishing some more complete system of higher geographical instruction than at present exists in this country, and have expressed their desire to avail themselves of such a system were it created."

Mr. Yule Oldham sends the following report of work at Cambridge during the past year:—

"During the past academic year I have lectured on physical geography. The attendance at the first part of the course, which

appealed to students of the Geological Tripos, was good, twenty men and some ladies being present. The more advanced portion naturally attracted fewer.

"In addition, I have given some forty lectures outside the University, principally in connection with the Extension movement, at Bishop Auckland, Burton-on-Trent, Scarborough, and York. These lectures were attended by large audiences, ranging from one to several hundreds, while the paper work done by students was of a high class.

"Last year I lectured at the summer assembly of the National Home Reading Union at Leamington, and have been invited to lecture again this year at the assembly to be held next month at Chester, as well as at the summer meeting of Extension students here in August.

"A year ago I was able to report that some useful modifications in the geography papers of the University Local Examinations had been made on my advice. These have met with considerable approvement, and as in December last more than 13,000 boys and girls, of all school ages in this country and our colonies, entered, the influence has been widespread. In the Higher Local examinations, however, which appeal to a more advanced class of students, geography has hitherto only been regarded as a subsidiary branch of other subjects.

"I am glad to be able to report a very important advance. A scheme has just been approved of, by the syndicate which regulates the examinations, by which geography will be included henceforth as a special division, on the same footing as languages, history, or natural science. This will enable teachers, for the first time, to obtain a certificate of a competent knowledge of geography, and should have important results.

"I understand, also, that at least one of the colleges here will make physical geography a subject for future scholarship examinations.

"Next year, by request, I shall again lecture on physical geography, and in addition have arranged to give a course of lectures on political geography for students of the Historical Tripos."

The following report has been sent by Mr. A. J. Herbertson, the Lecturer in Geography in the Owens College, Manchester :—

"The ordinary classes in geography at the Owens College are attended almost exclusively by first-year students of the Day Training College Department. This class was a small one in 1895–96, and the Education Department's regulation, excusing excellent geographical students, was again effective in making the numbers fewer than they might have been. Two courses of lectures were delivered—one on 'British Possessions in America,' and one on 'Cartography.' The lecturer proposed to give a third course of practical geography, but this was not sanctioned on the ground of lack of time. A few students, who had one spare hour during the week, were induced to devote it to map-drawing under the lecturer's supervision.

"By the courtesy of the Manchester Geographical Society, the Owens College evening classes in geography were held in the rooms of the Society, and their valuable collections of maps and lantern-slides were placed at the lecturer's disposal, as well as the use of their lantern. The subject of the course delivered before Christmas was 'The Commercial Geography of Eastern Asia,' and in 1896 two short courses of five lectures each were given: (1) 'The Highways of Commerce;' (2) 'The Commerce of Africa.'

"Two courses of University Extension Lectures were also delivered—one of twelve lectures on 'The General Geography of Greater Britain,' to the students of the Warrington Training College; the other of ten lectures on the 'Far East,' in conjunction with the Yorkshire College and the Young Men's Christian Association at Leeds. In addition to these courses, a number of single lectures on geographical subjects were delivered in the vicinity of Manchester, in connection with the 'Victorian' lecture scheme of the Manchester Geographical Association.

"The lecturer has to thank the Royal Geographical Society, the Manchester Geographical Society, and the Royal Scottish Geographical Society for lending maps, books, and lantern-slides needed to supplement the small resources of the Geographical Department at the Owens College in the preparation and illustration of lectures.

"During the last year considerable progress has been made in forming the nucleus of a geographical collection at Owens College. A better room, well lighted and furnished with cases, has been provisionally set apart for the use of the Geographical Department, and a grant of £30 voted by the College Council to buy materials. Part of this sum has been spent on apparatus for practical work, part in buying maps and books. Something has been done towards forming a small library of standard geographical works, which are constantly being referred to, and also in collecting geographical school text-books to enable intending teachers to form an opinion as to the books suitable for their future work in schools. The Department is indebted to the Council of the Royal Geographical Society, who have very generously presented a complete set of the last series of the *Proceedings* of the Society and the four volumes of 'Supplementary Papers,' and to Professor Meiklejohn, Messrs. Longmans and Co., Messrs. Macmillan and Co., and Messrs. Philip, Son and Nephew, who have kindly presented copies of their geographical school-books.

"Nevertheless, under existing conditions, the work of the geographical lecturer is not very encouraging, and the pecuniary sacrifice he is called on to make is considerable. He gets only the poorer material to work upon, owing to the Education Department's regulations and the lack of any University recognition of the subject. Even then he labours at a disadvantage. The students are well aware that their geographical work is somewhat of the nature of a humiliating necessity, a penalty for not doing well enough in the subject of the Queen's Scholarship

examination. They naturally feel it would be a pity to spend more time over it than the bare minimum necessary to satisfy the Education Department, and for this the College authorities allow about a score of hours in the year. The University authorities are being memorialized on this point, and also with reference to other modifications of existing regulations, which, without in any way interfering with existing interests, would place the Geographical Department in a much better position to do good work."

PROFESSOR DE LAPPARENT ON PHYSICAL GEOGRAPHY.

By HUGH ROBERT MILL, D.Sc.

THE importance given to purely geographical questions by the geologists of all countries is one of the most promising features of the present revival in geographical science, for geologists bring to the work eyes trained in observation and minds habituated to theory. The long succession of British investigators who may be said to have created the science of geology, and for many years sustained it almost alone, have never failed to recognize the important bearings of physical geography upon geology; but it has been reserved for the geologists of other countries to give prominence to the value of geology in the study of physical geography. And the recent work of three geologists has brought this aspect of the relation between geology and geography boldly to the front. Professor Penck in Austria, in his great 'Morphologie der Erdoberfläche;' Professor W. M. Davis of Harvard, in his papers on geographical problems (an admirable example being his "Development of Certain English Rivers" in this *Journal*, vol. v. p. 127); and Professor de Lapparent, in the book * which is the subject of this notice, all deal with geography from its geological side, and they all deal with the subject according to the scientific method, employing special terms for each conception, and working out mutual relations by the aid of hypothesis in the hope of arriving at a theory of geography.

Professor de Lapparent acknowledges his great indebtedness to Professor Davis for the clear and definite formulation of geographical processes and their results, and his book is the first attempt on so large a scale to apply these methods. The book is not a treatise on physical geography so much as an exposition of one aspect, the origin of geographical forms, or "Geomorphogeny." It contains, first, a statement of the general principles of the genesis of land-forms, and then a consideration of their occurrence in different parts of the world. The book contains twenty-five "lessons," and if we recapitulate these here, giving prominence to the statement of general principles, it may prove more

* 'Leçons de Géographie Physique.' Par Albert de Lapparent. Paris: Masson et Cie. 1896.

useful to our readers, and give a truer idea of the nature of the book, than if the main heads were elaborated with greater regard to literary form.

1. *The great lines of geography.*—Definition of physical geography; form and dimensions of the Earth; terrestrial relief; watersheds; comparisons of land-surfaces and ocean-beds; general plan of the Earth.

2. *The relief of the Earth's crust.*—Profile of land-surfaces and of sea-beds; the hypsographic curve; regional peculiarities of the continents; dissymmetry of the lines of relief.

3. *General conditions of land-modelling.*—Conception of land-modelling; agents of land-modelling and their dependence on meteorological conditions; sketch of meteorology and the control of atmospheric by geographical conditions; rainfall and deserts.

4. *Normal conditions of land-modelling by running water.*—Effect of running water on a homogeneous land-surface; conception of base-level; torrential river-track; changes of stream-lines and stream-capture; change of slope along a river-bed; flatness of the land at the mouth.

5. *Influence of genetic conditions on the process of land-modelling.*—Conditions which modify the process of land-modelling; fissured limestones, soft limestones, sandstones; heterogeneous districts; division of streams into sections; waterfalls; engulfing of rivers; rock-basin lakes; modelling of heterogeneous slopes; varieties of landscapes.

6. (i.) *Genetic conditions of modelling in eruptive and glacial formations.*—Cones and craters; lava-flows; intrusive rocks; granite; glacial deposits.

(ii.) *Passive tectonic influences.*—Definition; effect of dip of strata; development of step-structure; evolution of a river system; phenomena of river-capture; domes; monoclinal valleys.

7. *Passive tectonic influences in regions of folded and dislocated rocks.*—Regularly folded regions; anticlinal valleys; unequal folding; tectonic lakes; dislocated rock-masses; consequences of high dip; superimposed watercourses; influence of faults; valleys due to fractures; glens, fjords, and cirques; isolated rocks; depressions and the peculiar conditions of such territories.

8. *Cycle of erosion.*—Infancy, youth, and maturity of a river-system; torrential, middle, and lower course; alluvial plains and deltas; signs of maturity; old age of a system; peneplains, and examples of these forms; rate of base-levelling.

9. *Modifications of land-modelling by active tectonic agencies.*—Change of base-level and commencement of a new cycle; negative movements; formation of gorges and cañons; sinuous gorges; movements as a whole; plateaux properly so-called; positive movements; deformation of valleys; orogenic movements; transverse valleys; bordering lakes; volcanic phenomena; laccolites.

10. *Successive cycles of erosion. Analysis of some hydrographic systems.*

—Conception of cycles of erosion; instances from the United States; variety of hydrographic systems; rivers of rapid and discontinuous slope; instances from France; the Paris basin; the Rhine.

11. *Glacial land-modelling.*—Action of frost on rocks; action of glaciers; glacial valleys and amphitheatres; glacial lakes; changes in river-beds; post-glacial lake-sills; glacial and morainic topography; loess; eskars; geographical changes due to glacier action; tundras.

12. (i.) *Land-modelling by subterranean agencies.*—Landslips consequent on percolation of water; underground circulation; Karst phenomena; varieties of subterranean erosion.

(ii.) *Land-modelling by æolian agencies.*—The effects of wind and of insolation; effect of rain; dunes; the loess question; deserts and steppes.

13. *The sculpture of coasts.*—Power of waves; cliffs; shore-flats; erosion islands; estuaries; submerged valleys and gulleys; rias; fjords; glacial action on shores; deltas and lagoons.

14. *General summary of geological periods.*—Sedimentation and formation of stratified rocks; complications of geological history; archæan regions; chief divisions of geological time; metamorphic rocks; variation of physical conditions with time.

15. (i.) *Principles of palæography.**—The value of palæontology; meaning of archæan land-masses; search for ancient shore-lines; reconstruction of original relief; ancient mountains.

(ii.) *General outline of geographical evolution.*—Pre-Cambrian continents; Carboniferous continents; Jurassic continents; changes in the latest geological periods; the great depressions and folds of the Earth's surface.

16. *Europe in general; the British Isles.*

17. *The Scandinavian peninsula; the Russian platform; the low countries of Northern Europe.*

18. *Zone of ancient land-masses; the Paris basin.*

19. *Southern France, the Pyrenees, Iberian peninsula, Germany.*

20. *The chain of the Alps and the Carpathians.*

21. *The Mediterranean region.*

22. *Asia.*

23. *The Indo-African platforms.*

24. *North America.*

25. *Central and South America; the polar regions.*

Such is the plan of Professor de Lapparent's work. Its execution leaves little to be desired, except perhaps more precise instructions in the difficult but not unattainable art of interpreting the indications of

* The word *Palæography*, adopted by Professor de Lapparent to signify the reading of the records of the rocks, is already in use to denote the decipherment of ancient manuscripts; it would be better to use another word for the geological meaning.

maps, so as to see in them more than the ordinary observer can detect in the country itself. This, however, is a preliminary part of the work which can be better taught by the practical study of individual map-sheets than by trying to follow rules of general application. The study of land-forms in the light of their origin, and the phase of the cycle of development in which they are, opens a magnificent field of geographical work, demanding qualities which were not necessary to the earlier explorer, and dispensing with many which were indispensable to him. It is a method of working up acquired information which reveals many gaps in our knowledge of the Earth's surface, points out new directions in which explorations may advantageously be made, and demands more systematic scientific training on the part of travellers than was necessary before, if their observations are to take a place in advancing the science of geography.

Professor de Lapparent aims to make geography *rational*, a reasoned-out description of the Earth. "Thus understood," he says, "the scope of this science is very great. On one side it includes the precise definition of all the homogeneous unities into which the surface of the Earth may be divided, from the double point of view of their form and their origin. On the other side, it includes the investigation of how these unities react on the distribution of physical conditions which originate beyond our planet, and on which all the changes which take place on the surface of the Earth depend, whether in the mineral or the organic world. Then geography completes its work in tracing the picture of the definite results which this combination of diverse elements produces, and in which human activity takes its large and legitimate share."

LORD KELVIN'S SERVICES TO GEOGRAPHY.

THE University of Glasgow celebrated last month the jubilee of the professorship of Lord Kelvin (Sir William Thomson), who was elected to the chair of Natural Philosophy in June, 1846. The occasion was made an opportunity for presenting the congratulations of the scientific world to the first British man of science of the day, and an imposing array of delegates from the universities and scientific institutions of all countries assembled in Glasgow on June 15, for this purpose. The Royal Geographical Society was represented on the occasion by Dr. John Murray, of the *Challenger*, one of the Council of the Society; and it may be interesting, in a few lines, to indicate the reasons which made it proper that a Geographical Society should join with other scientific bodies in doing honour to a great physicist.

Lord Kelvin's services to science have lain mainly in the region of pure physics, where he has excelled both as a mathematical and an experimental investigator; but his researches, whether on dynamic, or

thermal, or electrical phenomena, touched constantly on the actual conditions of the Earth. They also found expression to an extent never before shown, in practical mechanical contrivances which have indirectly led to some of the great modern developments in physical geography. Out of the 262 scientific papers credited to Lord Kelvin in the Royal Society's catalogue (up to 1883) more than fifty relate to the physical conditions of the Earth. His application of practical recording apparatus to submarine cables led directly to the vast extension of cable-laying in which Lord Kelvin personally took part, and this probably induced him to devise those unequalled navigational instruments with which all well-found vessels are now equipped—the Thomson compass, and the navigational sounding machine. The development of the use of wire for deep-sea soundings is also directly due to Lord Kelvin. Without cable-laying and the exact deep-sea soundings required for determining the form and physical condition of the ocean bed, the modern science of oceanography would have been impossible.

Another direction in which Lord Kelvin has rendered important services to physical geography is in his treatment of tidal observations, and the invention of his harmonic analyzer for the curve-records of tide-gauges. His early study of the conditions of ice-melting under pressure led to theories of glacier movement; and also to the investigation of the theoretical influence of polar ice-caps in changing sea-level. The internal temperature of the Earth, its rate of secular cooling, and the character of the crust as influenced by its form, rigidity, rotation, and tidal retardation, occupied a number of papers the publication of which extended over half a century. Waves in water produced by wind or by the movement of solid bodies through the water, also formed a favourite subject for observation and mathematical analysis. In recent years two papers of remarkable interest showed how the more superficial geographical problems suggested applications to other sciences—one an address to the Royal Institution in 1893 on "Isoperimetrical problems," the other on the construction of "Mercator charts" of any continuous closed surface.

The volumes of Lord Kelvin's "Popular Lectures and Addresses," dealing with navigational affairs and with geology and general physics, exhibit to perfection the clear grasp of principles, the quaint and luminous exposition, often playing on the verge of humour, which forms the unique charm of his popular, and often, indeed, of his abstruser writing. But Lord Kelvin's greatest claim to the gratitude of the student of Earth-science is his masterly enunciation of the principles of energy which bind together the whole life-history of the solar system, and give the clue to the interrelations of all the various forms of physical activity which surge upon the surface of the world. The theory of the dissipation of energy might almost be viewed as the basis for a theory of physiography, if that somewhat vaguely defined word were taken in

the sense of the description of the running-down of the energy of the solar system, or even of the universe, from its initial condition of diffused matter at high and unequal temperature to its final condition of aggregated matter at lower uniform temperature.

THE MONTHLY RECORD.

AFRICA.

Herodotus in Egypt.*—Professor Sayce has lately published a short sketch of Egyptian history, with especial reference to the relations of Egypt with the Jews from the time of Abraham down to the age of the Roman Empire, and also to the visit of Herodotus to the country. It is intended to supply travellers and students with a concise summary of information only obtainable elsewhere in more cumbrous works, and to put before them the general results of recent excavations and discoveries in their bearing on the subjects dealt with. To geographers the chief interest centres in the chapters which relate to the visit of Herodotus, for although, as might be anticipated, the views of Professor Sayce as to the character of the information given by the Greek historian differ considerably from those generally accepted, the systematic attempt to follow his travels in the light of recent discoveries cannot fail to be of value. Professor Sayce, as is well known, considers that many passages, in which at first sight the historian appears to be giving the result of his own observations, are, in fact, embodied from the writings of his predecessors (especially Hecatæus, who had visited Upper Egypt), largely mingled with stories which he heard from his guides in Memphis and Sais. The quotations were quite justifiable, but—quotation marks not having been invented in those days—are somewhat liable to mislead. From internal evidence, he considers that Herodotus saw the delta only while flooded, his journey thus falling between the beginning of July and the end of October. This period would be fully occupied with his tour through Lower Egypt, and in spite of the statement in Book II. chap. xxix., as to Elephantine being the limit of personal observation, Professor Sayce (presumably assigning this statement to a quotation) holds that he never passed south of the Fayum. Many instances are given of the incorrectness of the information relating to Upper Egypt, which is only mentioned incidentally in the narrative, while of the monarchs whose memorials were to be found chiefly in the south—at Thebes, Abydos, and Assuan—Herodotus had never heard, the Fayyum being the southern limit of his historical no less than of his geographical knowledge. The evidence of the monuments is also called in to show that after the age of Hecatæus Upper Egypt was long closed to Greek sightseers, owing probably to the disturbed state of the country following on the revolt against the Persians. Having thus fixed the limits of the journey, Professor Sayce attempts to follow the Greek traveller step by step through the delta, by Naukratis to Memphis and Heliopolis, and back to Pelusium, devoting a separate chapter to the route through Memphis itself and the Fayum. Here all is clear and determined, the order in which the kings are given showing even the order in which the various monuments must have been visited. The Fayum was inundated at the time of the visit of Herodotus, and a great part of his Lake Mœris, which he thought the creation of the Pharaohs, was in reality due to neglect of the dykes which should have held back the water. Useful tables of the Egyptian dynasties, nomes, etc., are given in appendices.

* 'The Egypt of the Hebrews and Herodotos.' By the Rev. A. H. Sayce, Professor of Assyriology at Oxford. London: Rivington, Percival & Co. 1895.

Mayeur's Journeys in Madagascar in the Eighteenth Century.—In the *Revue Scientifique* (1896, No. 18) there is the report of a lecture by M. Grandidier before the French Congress of Learned Societies, in which the well-known authority on Madagascar gives some account of the journeys of Mayeur in the island during the latter part of last century. While other less conscientious writers have attracted notice, and have been consulted as authorities down to our own day, the writings of Mayeur, the geographical and ethnographical importance and strict truth of which are evident, says M. Grandidier, at the first reading, have neither been published * nor consulted by those who have written on the island. His accounts not only tell us of the state of affairs which existed a hundred years ago in the north and centre of the island, but really hold good at the present day, and it is quite time that they were rescued from the oblivion into which they have fallen. Mayeur lived thirty years in Madagascar, from 1758 to 1787, acting as government interpreter at the French establishments on the north-east coast, and during this time he was entrusted with various missions into the interior, by which he became well acquainted with the physical features of the country as well as the characteristics of the chief tribes of the north and centre of the island. Among other journeys, we may mention in particular: one from the bay of Antongil, across the bare interior uplands to the Sakalava country on the west coast, in which he found the Sakalavas as rude and difficult to deal with as they have since proved themselves; one to the extreme north of the island, during which he visited Nossibé, and remarked on its suitability as a station for French shipping; and in particular two to the province of Imerina, in which he became acquainted with the Hovas, and established friendly relations with their king. Here too he speaks of the general bare and arid nature of the interior plateau, a fact which has only been grasped by geographers within recent years. He was much struck with the industry and social organization of the Hovas, and the high level at which they stood in comparison with the coast tribes, although recognizing their propensity to cheat, and some other unamiable qualities.

Exploration of the Sanaga River, Cameroons.—In December, January, and February last a reconnaissance of the course of the Sanaga above the Edea falls was made by Lieut. v. Brauchitsch, with a view to testing the navigability of the river (*Deutsches Kolonialblatt*, May 1, 1896). Although the result was unfavourable as regards the special object in view, the journey has somewhat enlarged our knowledge of the country and its inhabitants. Whereas Capt. Ramsay, in his journey in 1892, had travelled chiefly on the north side of the river, often diverging from its banks, Lieut. v. Brauchitsch kept entirely to the south side, remaining near the stream throughout. The examination of the waterway began at the crossing place at Sakebayeme, after a seven days' march from the Edea station, through thick forest. Its course, as far as followed, was a constant succession of rapids, with only short stretches of calm water between. The Logotum falls which were met with seem to be the most important after those at Edea. After remaining narrow for some distance, the bed of the stream became immensely wide, and was filled with a chaotic sea of rocks, among which the stream appeared from the bank to vanish entirely. The advance was finally stopped by the hostility of the Ndogobuea tribe, but at the highest point reached it seemed that the stream was becoming quieter, as the banks became low, and sandbank appeared. By keeping close to the river, the explorer saw few of the inhabitants.

* Mayeur's manuscripts were, however, largely used in the compilation of the "Histoire de Madagascar," published at the Île de France in 1809, by the Chevalier de Froberville. (*See* Oliver's Madagascar, ii. p. 231.)

The Bajop tribe on the south bank proved shy but friendly, but the Babimbi on the north shouted defiance across the stream. European salt, which at Edea has become an important article of trade, had not reached the Bajops, who gave the impression of great poverty, and had not before seen a white man. Elephants and gorillas abounded in the forests. A chart of the stream, here known as "Lom" only, accompanies Lieut. v. Brauchitsch's report.

The Marine Forms of Life in Lake Tanganyika. — It is to be noted that Mr. Moore, who has been assisted by a money grant from the Royal Society, is now engaged in a study on the spot of the fish and fresh-water Medusæ of Lake Tanganyika (*Journal*, vol. vii. p. 663). The existence of a marine type of shells in the lake was first made known by Captain E. C. Hore; while the Medusæ, which it is Mr. Moore's chief object to study, were discovered by Mr. Swann, now Deputy-Commissioner in Nyasaland.

French Expedition to the Middle Niger.—News has been received in Paris (*Comptes Rendus*, Paris Geogr. Soc., 1896, p. 133) that the expedition under Lieut. Hourst, originally planned when Captain Toutée was starting for the Middle Niger from the south, finally set out from Kabara, the port of Timbuktu, on January 21 last. Several officers accompany M. Hourst, including M. Bluzet, already known for his work in the neighbourhood of Timbuktu; and the intention is to thoroughly explore the course of the Niger as far as Say, including the almost unknown section above Captain Toutée's furthest point. The expedition is well supplied with scientific instruments, and a novel item in the outfit is a phonograph for the recording of native music. It is also announced that a geographical reconnaissance has lately been made by Commandant Réjou in the neighbourhood of the lakes connected with the Niger south-west of Timbuktu, in the course of which the position of Lake Dauna, south of Lake Faguibini, was fixed.

AMERICA.

Tidal and Current Surveys in Canada.—A "Report of Progress—Survey of Tides and Currents in Canadian Waters" has recently been published by the Canadian Department of Marine and Fisheries, giving an account of the work done up to October 31, 1895, by Mr. W. Bell Dawson, the engineer in charge of the special survey. Seven of Lord Kelvin's recording tide-gauges have been erected, special precautions being taken to guard against the freezing of the tide-tubes in winter, and the disturbance by wave-motion during gales. The tide-gauges are all in the St. Lawrence or on the Atlantic coast, their situations being St. John, New Brunswick; Halifax, Nova Scotia; St. Paul island (north of Cape Breton island); Forteau bay, strait of Belleisle; Anticosti; Father point (near Rimouski); and Quebec. By the aid of records from these stations new tide-tables are being compiled, which will supersede the imperfect tables at present in use. The datum levels of the Admiralty and Geodetic surveys will also, by the new observations, be fixed with regard to true mean sea-level. The result of two seasons' investigations of the currents in the Gulf of St. Lawrence has been of practical value. The current in the strait of Belleisle, instead of being a steady indraught from the Atlantic, as formerly supposed, was found to be fundamentally tidal, but a continuance of steady wind either from the east or from the west gradually overcomes the opposite tidal flow, and causes the current to run eastward or westward regardless of the tidal phase as long as the wind lasts. The average rate of the current is about 2 knots, the fastest observed was a little over 3 knots. The observations of the southern part of the gulf and Cabot strait undertaken during 1895 had not been sufficiently worked up to admit of conclusions being given in the Report. But the distribution of temperature and salinity was

found to be curious and interesting. A cold layer of comparatively fresh water appeared to lie between the deep layer of warmer and salter water and the surface layer of warmer water of similar salinity. The cold layer in all parts of the gulf was found to lie between 30 and 50 fathoms.

Navigation of the Magdalena.—A report on this subject, dated January 23, 1896, from Mr. E. MacGregor, acting British Vice-Consul at Barranquilla, has been kindly placed at our disposal by the Foreign Office. The navigation of the river is divided into two sections—one from Barranquilla nominally to Honda (lower river), and the other above Honda (upper river). Though Honda, 603 miles above Barranquilla, is the chief commercial centre between the upper and lower river, it is no longer a river-port. Between Arrancaplumas, a short distance above Honda, and Yeguas, 15 miles below Honda, the fall in the bed of the river is so great as to produce a series of rapids difficult to surmount, and accordingly the traffic between these two points is carried on by means of a railway belonging to a British company. This railway it is proposed to continue to Conejo, a point on the river 12 miles lower down, but there appears to be great delay in carrying out this intention, as the railway had reached the point where it still ends at the date of the report mentioned in the note below, at which date the whole railway then contemplated to La Dorada, 7½ miles below Conejo, was expected to be finished the following year. The upper river navigation usually extends to Girardot, 718 miles above Barranquilla, sometimes in high water as far as Purificacion (754 * miles), or even to Neiva (830 miles). From Girardot a short railway runs north-east at present to Juntas de Apulo, but it is intended to continue this railway ultimately to Facatativa in the north-west of the plain of Bogotá. About forty steamers belonging to various companies now ply on the Magdalena; all stern-wheelers burning wood for fuel, their capacity varying from 30 to 300 tons. Seven to eight days are required for the up journey in the lower river, four days for the down journey; but the length of the journey is due to the fact that for most of the way it is not safe to proceed by night. When the water in the river is at a moderate height, one can proceed by night and day as high as La Gloria, 282 miles above Barranquilla. For the further development of the river traffic the chief requirement is the opening of a safe passage for sea-going vessels from Barranquilla by the Boca de Cenizas, the main mouth of the Magdalena, to Savanilla. Between 1876 and 1884 a cattle-trade with Cuba was carried on by this mouth in steamers of the Royal Mail, Atlas, and other companies, without serious accident, but now this route is abandoned in favour of the railway to that seaport.

The Mexican Drainage Canal.—The following notes regarding the drainage canal of the plain of Mexico, which is now nearly completed, are taken from a recent paper on the subject by Mr. F. H. Cheesewright, read before the Society of Arts. The completion of this great work has solved a problem that has occupied the attention of all interested in the city of Mexico for the past 500 years. The city of Mexico is built in the centre of a vast basin of an oval form, about 200 miles in circumference, and is surrounded by mountains, one or two being amongst the highest in the world. The soil was at one time thickly wooded, but is now mostly bare, and, in many places, white with the incrustation of salts left by the receding waters. Five lakes, occupying about one-tenth of the surface of the valley, receive the fairly heavy rainfall and the drainage of the mountains. These lakes have different levels, some being higher and some lower than the city, consequently the drainage of such a vast area is a matter of great difficulty and costliness. The canal

* These distances are taken from a U.S. Consular Report, dated November 10, 1884, published in No. 47 of the series of Consular Reports of the U.S.

starts from the San Lazaro station of the Hidalgo Railway, runs on the east side of the Guadelupe mountain range, between this range and Lake Texcoco. It then changes its direction to the north-west, diagonally traversing San Christobal lake, a part of Jaltocan and another of Lake Tampango, where it finishes at the mouth of the tunnel, having a total length of 67½ kilometres, or 43 miles. The beneficial effect that the canal will have on the climate of Mexico city cannot be over-estimated.

POLAR REGIONS.

Arctic Regions.—The Arctic campaign for the present year has now fairly begun, three separate expeditions being now on their way northward, in addition to Sir W. M. Conway's expedition to Spitzbergen. From Tromsö telegraphic news has been received that the *Virgo*, conveying Herr Andrée's balloon expedition, sailed from that port on June 15. The ice-conditions to the northward were considered to be good, though this opinion was not based on positive information. According to Herr Andrée's plans, the final start in the balloon is to be made from one of the Norsköarne islands, situated near the north-west corner of Spitzbergen. On June 9 the *Windward* left St. Katherine's docks on her second voyage to Franz Josef Land, carrying large quantities of supplies for Mr. Jackson, as well as a reinforcement to his land party. The ship is commanded by Mr. James Brown, whose experience as a Peterhead whaler in Arctic voyages dates back more than thirty-six years; and the ice-master is Mr. John Crowther, who has already made three voyages to Franz Josef Land. Mr. W. S. Bruce, already known for his voyage to the Antarctic with the Dundee whalers in 1892–93, goes out to join Mr. Jackson as a scientific member of his staff. Sheep, coal, and live reindeer will be embarked at Vardö, and it is hoped that communication will be opened with the explorers at Cape Flora, Franz Josef Land, before the end of July. The *Windward* may be expected back in England by the end of September, but Mr. Jackson and his party will probably stay out another winter. The third expedition is that of Lieut. Peary, who is now at St. John's, Newfoundland, making the final preparations for his new expedition to Northern Greenland. He hopes to start for Bowdoin bay, Inglefield gulf, on July 8, in the steamer *Hope*, which he has chartered for the voyage. His object is to complete his ethnological studies, and he means, if possible, to bring home the great mass of ironstone at Cape York, which is believed to be the largest meteorite in existence. Mr. Jeafferson, accompanied by Mr. Farnham, proceeds to the north-east island of Spitzbergen, his main object being to visit the islands which lie to the north and north-east of that land.

MATHEMATICAL AND PHYSICAL GEOGRAPHY.

Glacier Movements.—Professor I. C. Russell, in the *Journal of Geology* (vol. iii. p. 823), gives a discussion of the part played by rock-*débris* in the movement of glaciers. He starts with the proposition that "the rate of flow of glacier ice, under given conditions, will depend on the percentage of *débris* commingled with it, and be least when the percentage is greatest. The nature of the *débris*, whether coarse or fine, smooth or angular, etc., will modify the result, but this need not be considered at present." Applying this proposition to the action of glaciers, many apparent anomalies are readily explained. For example, the same glacier may be a powerful agent of erosion in its upper course, where the proportion of *débris* is too small to check the rate of flow, and great enough to supply material for abrasion, while in its lower course the ice may be so heavily charged with *débris* as to be deprived of plasticity, rendered stagnant, and so enabled to act as a preservative against erosion or as a means of deposit. The periodical variations in the lengths

of glaciers, the origin of moraines, and of drumlins may also be explained by application of the principle. The instances adduced are intended as a guide to glacier students rather than as dogmatic statements, and they seem well worthy of being carefully tested.

Topography and Hypothesis.—In the first number of the current volume of *Science* (vol. iii. N.S., p. 1) there is published an address by Mr. G. K. Gilbert, which may be looked on as a philosophic sermon preached from a topographic text. He speaks of the scientific method of investigation by means of hypothesis, and shows how the method was actually employed in the endeavour to account for one of the most singular land-forms which has ever been observed. This is a hollow of crater-like appearance, a few thousand feet in diameter, a few hundred feet in depth, roughly circular in outline, and surrounded by a raised rim. It is situated in Arizona, near Canyon Diablo, and is called Coon Butte. The plain is composed of horizontally stratified limestone, overlying horizontally stratified sandstone, but the edges of the crater show that the strata have been bent up all round, and now dip away from the hollow. In the immediate neighbourhood of the depression, large quantities of meteoric iron have been discovered. The object of the paper is to discuss the hypotheses which have been brought forward to account for two such unusual phenomena as a crater in sedimentary rocks with no trace of a volcanic outburst, and the occurrence of large masses of meteoric iron. Mr. Gilbert formed a comprehensive theory to account for both. He supposed that a meteorite of great size, about 1500 feet in diameter, had struck the Earth at this point, and so produced the hollow, the main mass becoming embedded in the rock, while broken-off fragments supplied the meteoric masses which were found. If this were so, the volume of the hollow should be less than that of the rim by the volume of the buried asteroid. Mr. Gilbert and Mr. Marcus Baker visited the place, made an exact topographical and magnetic survey, and found the volume of the hollow substantially the same as that of the rim, while no indication of a buried mass of iron was to be found. The crucial test having pronounced against the impact theory, the hypothesis of a steam-explosion was next applied, and was not apparently contradicted by any of the appearances, the meteoric iron being supposed to be merely an accidental occurrence at that particular place. But it was then suggested that the asteroid might have been of rocky substance, with only a few masses of iron embedded in it "like plums in an astral pudding," and that the impact compressed the rocks at the bottom so as to occupy less volume. Another hypothesis connecting all the observations was, that a relatively small meteorite determined by its impact an explosion of steam, which was ready to go off when the "volcanic button" was touched. But so far no crucial tests have been devised to eliminate either hypothesis, and Coon Butte must still be viewed as of doubtful origin.

Ocean and Atmospheric Currents and the Variation of Latitude.—In the *Astronomical Journal* for April 6, Professor Simon Newcomb points out a possibly physical reason for the displacement of the position of the terrestrial pole, which observation has shown to amount to a total range of about 10 feet. The reason suggested is the circulation of the atmosphere and ocean through permanent winds and currents. A movement of the central parts of the Pacific Ocean towards the pole of about 150 feet per day, with a correspondingly greater flow of the Atlantic in the opposite direction, and with the whole movement successively reversed in direction every six months, would account for the whole observed displacement. It is, of course, still to be ascertained whether the mass movements of the ocean really are directed in this way, and at present it would appear that our knowledge of under-currents is not sufficient to enable a definite conclusion to be arrived at.

International Earthquake Observatories.—Dr. G. Gerland, of Strassburg, sends us an excerpt from the *Beiträge zur Geophysik*, of which he is editor. It relates to the establishment of an international system for the observation and recording of earthquakes. That there should be some system by which the records of earthquakes, which, in some portion or other of the world, occur several times per day, could be collected together for purposes of analysis, is a proposition that has long agitated the minds of seismologists. In January, 1895, Prof. John Milne, of Japan, issued a suggestion that the *unfelt* earthquakes of the world should be systematically recorded. The present proposition, which comes, we believe, from the pen of that indefatigable worker, the late Dr. E. von Robeur-Paschwitz, embraces the suggestions from Japan, and, in addition, proposes the establishment of a centre at which notices of all earthquakes are to be published. However advisable this might be, when we remember that Japan alone, with nearly 1000 observing stations, cannot keep pace with the records of its own country, and see the monthly lists issued by Tacchini, Cancani, and Agamennone, we fancy that the practical realization of the proposal now before us would be surrounded by many difficulties. From what this Society recently heard from Prof. Milne (*Geog. Jour.*, March, 1895), it seems that certain seismologists are inclined to the belief that the movement of *large* earthquakes is propagated, not simply round, but *through* the Earth, and by studying the velocity of this propagation, new light will be thrown upon the nature of the interior of our planet. A primary consideration is to determine the best form of instrument to be used in making a seismic survey of the world, and, chiefly with this object, a committee, in which we see the names of Lord Kelvin, Prof. G. H. Darwin, and others, who have given great attention to the solution of problems connected with geophysics, was appointed by the British Association. The report which they will shortly issue we trust may be of value to those who are interested in the scheme now so ably advocated by Dr. G. Gerland.

The Thermophone.—In a recent number of *Science*, Mr. George C. Whipple describes a very ingenious form of telethermometer invented by Mr. H. E. Warren and himself, which should prove exceedingly useful in meteorological and oceanographical research. The instrument, which has been named the thermophone, consists of a modified form of Wheatstone bridge, in which two arms are composed of copper and German-silver wire respectively. The change of resistance of these metals with temperature being different, the balance can be restored by altering the resistances of coils placed at the near end of the system, the precise point being ascertained by the use of either a galvanometer or a telephone. The thermophone has already been used in making temperature observations in Lake Champlain at depths up to 370 feet, and has been found to give results trustworthy to within 0·1° Fahr. We see no reason why it should not be employed at much greater depths, and it is, perhaps, not too much to hope that it may bring us within reach of the time when reversing and self-registering thermometers, and all their encumbrances, may be fully done away with.

GENERAL.

The Church Missionary Atlas, Eighth Edition, 1896.—This volume of 230 pages of printed matter, and thirty-two coloured maps, from the geographical establishment of Messrs. Stanford and Co., has reached its eighth edition. With the object which the Society which publishes it has in view the Geographical Society has nothing whatever to do, but a worthy contribution to geographical Science deserves a brief notice for its own intrinsic merits. It represents "applied geography." The art of the cartographer is utilized to bring home the local features of regions in

many parts of the world, and the printed matter specially illustrates each region from the point of view of the object of the publication. Among the thirty-two maps is one (the frontispiece) to illustrate the distribution of the human race under the different religious conceptions; two maps illustrate the varieties of languages spoken in British India and the continent of Africa. The remaining twenty-nine represent regions in Africa, east, west, and south; in Southern Asia, from Syria on the west to Japan in the extreme orient; the islands of New Zealand in Oceania; the Dominion of Canada in North America. An atlas "pure and simple" resembles a dictionary of a language, and presents dull and disconnected reading; but this work resembles rather an encyclopædia of a particular branch of knowledge, illustrated by carefully drawn maps, representing certain special facts in different colours; in fact, it presents to the eye and understanding a basis of the knowledge essential for grasping a particular subject of study. The matter contained in the printed pages is accurate, interesting, and instructive. Admitting that the main features of geographical Science are (1) physical, (2) political, and (3) ethnological, pure geography may be deemed to end there. Still, the student of the world and its population is led to inquire (1) what language the inhabitants speak; (2) what religious conception they have adopted; (3) to what degree of culture they have attained; and (4), lastly, what are the more fortunate and more highly gifted races of Europe and North America doing at the present moment for the benefit of the so-called inferior races? Such information is supplied by this book in a fresh and engaging manner for certain portions of the globe, and no Englishman, who takes the trouble to read the particular portion of the volume, to which local predilections attract him, can fail to derive instruction and advantage.

R. N. C.

Map-Reading and Map-Interpretation.—M. de Lapparent, in a lecture to the French Association for the Advancement of Science, in February last (*Revue Scientifique*, vol. 5 (1896), p. 385), lays stress on the value of map-reading as an educational exercise in geography. He does not limit the term to the mere recognition of conventional symbols as representing rivers, roads, hills, forests, etc., but includes the interpretation of these so as to present to the mind's eye, not only the appearance of the country represented, but also something of its structure and the harmony of its various parts. M. de Lapparent compares this kind of map-reading to that of a musician reading a score, and able, without the intervention of an instrument, to appreciate the harmonies of sound. The training to give this power of geographical interpretation is not to be looked on as very severe; it is less the acquisition of a fresh burden of knowledge than the better orientation of ordinary geographical studies. The paper is mainly devoted to the exposition of cases in which the ordinary maps of a region may be made to tell a great part of the history of its geographical evolution, and even of its geological structure.

OBITUARY.

William Chandless, M.A.

By Colonel George Earl Church.

On the 5th ultimo, Mr. William Chandless, M.A., one of the Gold Medallists of this Society, died of inflammation of the lungs, in London, where he was born November 7, 1829. He was the son of Mr. Thomas Chandless, Q.C., and his mother was the daughter of Sir William Long, of Bedfordshire. He graduated at Trinity

College, Cambridge, where he took high honours, being third in the classical tripos. He afterwards studied law for two years; but, finding that he had no taste for the legal profession, and being possessed of ample fortune, he abandoned the law. Apart from his classical attainments, he was a good mathematician and a keen observer. Generous, quiet, unassuming, and entirely regardless of self, his hand was ever open to unostentatiously assist others. To these qualities he added great courage, caution, patience, tact, and love of adventure—just the man for an explorer.

The year 1854 found him on the banks of the river Missouri, where, seeing many waggon-trains and cattle *en route* for Utah, he engaged as a teamster at $25 per month, not being allowed to accompany them in any other way. To this early journey we are indebted for his agreeable work, 'A visit to Salt Lake, and a Residence in the Mormon Settlements of Utah.' Thence he wandered across the Rocky mountains to Los Angeles and San Francisco—a dangerous venture in those early days. From the latter city, he went to Acapulco, the Spanish emporium of trade with India in colonial times, and, crossing Mexico, returned home. In 1858 he went to Brazil; but the following year was in the Argentine Republic, arriving at Mendoza during the series of great earthquakes which for over a month shook that city. Thence he crossed the Andes to Chile, and from Valparaiso probably went to Peru and Ecuador, although the few scraps of information obtainable make his route uncertain; but in 1861 he passed the Ecuador boundary-line into Colombia, then indulging in one of its revolutionary outbreaks. Here travelling was perilous, and he suffered many detentions from the contending factions.

Soon afterwards, we find him at Manaos, the central city of the Amazon valley, where he took up his residence for a long period of time, and devoted himself to the study of the grand network of rivers which there invited his examination. In May, 1862, a paper was read at the Society giving an account of his exploration of the Tapajos, which he ascended to its source, 1200 miles above Santarem; but his attention was especially attracted to the mysterious and little-known Purus, the headwaters of which were then supposed to be within easy reach of the ancient capital of the Inca empire. The Madeira river, which runs parallel to the Purus, had been descended by Gibbon, in 1851, after visiting the slope of the Andes east of Cuzco; and he supposed that the Mayu-tata—which afterwards proved to be an affluent of the Beni branch of the Madeira—flowed into the Purus. Markham, after descending to the sources of the Mayu-tata in 1853, also believed them to empty into the Purus, and, with glowing pen, added to the glamour and romance which even now surround these regions formerly dominated by the Incas. Like Gibbon, he justly called attention to the vast benefits which might accrue to commerce if it were found that they were accessible from the Amazon by steamer. Diplomatic pressure was soon after put upon Brazil to open its giant river-system to trade.

It was not within the nature of such an adventurous traveller as Mr. Chandless to resist the temptation to explore and define the doubtful source of the then least-known of the tributaries of the Amazon. The incentives were more than sufficient. He commenced the task in June, 1864, and terminated it in February, 1865, entirely at his own expense. During this interval of time, he ascended the highly tortuous course of the Purus 1866 miles, until stopped for want of sufficient water for his canoe. The accuracy of his work, his description of the river, his observations upon its value as a commercial artery, the products of the region traversed, his numerous and careful observations for latitude and longitude, all stamp his survey as one of the most useful thus far made in the Amazon valley; while the extraordinary

tact and courage which characterized his relations with the numerous savage tribes he met throughout the course of the river, marked him as a man of rare qualifications for such a venturesome exploration. His paper on "The Ascent of the River Purus," read before the Geographical Society February 26, 1866, showed how well he had earned the honour of "Gold Medallist" which the Society conferred upon him.

In 1868, Mr. Chandless accomplished another interesting and useful task—the thorough exploration of the Juruá, published in the Society's proceedings for 1869. He ascended this wild, crooked, and forest-enveloped stream to its extreme source, 1133 miles. These surveys, aggregating over 5000 miles of main streams and branches, and representing three of the main southern tributaries of the river Amazon, have been of great value to geographical science, and have served as bases to correct the mistakes made in the location of many rivers which had previously been examined and mapped only in the rudest manner.

It is probable that Mr. Chandless' explorations of the Tapajos and Purus, and the attention which the Society called to them, largely influenced the issue of the decree of the Brazilian Government (December 7, 1866), opening a great part of the Amazon river to all flags.

Mr. Chandless left a legacy of £500 to the Society, free of duty.

John Buchanan, C.M.G.

We regret to have to announce the death of Mr. John Buchanan, who, with his brother Robert, has done so much to develop the resources of Nyasaland. A warm tribute to the value of his services was paid by the late Mr. Joseph Thomson, who during his last expedition had the opportunity of himself seeing the work he had accomplished. Mr. Thomson placed him among the four men who might be considered the founders of British Central Africa, and the person who above all others had practically shown (by his agricultural enterprises) the direction in which the country must look for its future development. An account by Mr. Buchanan of a journey in Nyasaland was published in the *Proceedings*, vol. 13, and a paper on the "Industrial Development of Nyasaland" was read by him before the British Association in 1892, and printed in the first volume of the *Journal*. He had been acting British Consul at Nyassa since 1888, and was made a C.M.G. in 1890. At the time of his death he was on his way to Europe, but succumbed in March last, at the mouth of the Zambesi, to a severe attack of fever contracted during the river journey. His loss will be keenly felt in the Nyassa colony.

Obituary of the Year.

The following is a list of the Fellows of the Society who have died during the year 1895–96 (May 11):—

Captain Carl Alexanderson; George Bentley; James Brand; Captain T. H. Butterworth; H. H. Browne; Dr. Robert Brown; Dawson Borrer; John Buchanan; Charles Clauson; H. H. Somers Cocks; Dr. Hugh Cleghorn; David Chadwick; Sir C. C. Clifford; Humphrey Chamberlain; William Chandless; Captain H. G. Dunning; H. J. Dore; Wm. Alex. Duncan; Admiral the Hon. F. Egerton; Colonel W. E. Evans; Alexander Ewing; Henry Fowler; James Forrest; Thomas Fuller; Rev. F. P. Flemyng; General Sir W. A. Fyers; Admiral R. O'B. Fitzroy; Viscount Gough; T. M. Gisborne; Rev. W. T. Giles; Sir Julian Goldsmid; Rev. J. H. S. Graham; M. W. Geary;

Professor Huxley; W. A. Higgs; the Sultan of Johore; General H. Campbell Johnstone; Major-General G. W. Knox; General J. A. V. Kirkland; Joseph Lewis; William Lawson; Philip H. Lawrence; William Lockhart; Captain S. Long; Rev. Chauncey Maples; Sir William Mackenzie; Sir P. M. Melvill; A. F. Mummery; Colonel J. P. O. Mitford; T. B. Muggeridge; Alexander Macmillan; James Medwin; Alvan Millson; Duncan MacNeill; C. G. Nottage; H. Nesbit; Percy Nightingale; Cristoforo Negri; W. E. Oates; A. J. Price; the Earl of Pembroke; Admiral Ruxton; Colonel Sir John Robinson; Colonel C. J. Cramer Roberts; Dr. H. Rink; E. M. R. S. Emmott Rawdon; Lieut.-Colonel T. R. Stewart; Captain S. S. Smith; J. B. Sedgwick; A. J. Scott; Major Henry Shuckburgh; Sir R. Macdonald Stephenson; Henry Seebohm; Charles Soppitt; F. H. Smiles; William Square; J. Gibb Shaw; Joseph Thomson; the Earl of Verulam; Bryce M. Wright; Sir Thomas Wade; John Whitford; Sir Samuel Wilson; G. T. Wickenden; J. W. Walton; Rev. Horace Waller; General J. T. Walker.

MEETINGS OF THE ROYAL GEOGRAPHICAL SOCIETY, SESSION 1895–96.

Fourteenth Ordinary Meeting, June 1, 1896.—Sir George D. Taubman Goldie, K.C.M.G., Vice-President, in the Chair.

Elections.—*William Chubb Meredith, M.A.; Captain S. F. W. St. John; Thomas Simpson; George Frederick Vernon.*

Sir Clements Markham, K.C.B.

The Chairman, Sir George Goldie, said: Before calling on Mr. Bent to read his paper, I will utilize the moment or two at the disposal of the Chairman by referring to an incident which has occurred since our last meeting, of no little interest to the Royal Geographical Society. I allude to the distinction which her Majesty has been pleased to grant to our President. Sir Clements Markham is not able to be present to-night, as he has had to seek a short but much-needed change and rest, and is, I believe, at this moment with the Channel Squadron off the west coast of Scotland; but I have no doubt he will be back in plenty of time to preside at our annual meeting two weeks hence, and I feel sure that the Fellows will then express their satisfaction at the honour bestowed on him. I do not propose to go at length into his public services, which have extended over so many years, but I may be permitted to refer to one point of special interest to all those connected with the development of Africa—I mean his introduction of the cultivation of the cinchona plant into India. I think it will be agreed that, in the present state of medical knowledge, the possibility of settling the vast regions of tropical Africa and of civilizing the scores of millions of inhabitants of these regions largely depends on the cheapness of the production of quinine. That particular point in our President's record is, therefore, a very interesting one at this moment; but I do not propose, as I said, to dwell upon Sir Clements Markham's personal record. I would remind you that, in the *Gazette* which conferred his K.C.B., he was entered as the President of the Royal Geographical Society, and I think every Fellow of this Society will feel that the Society and he share in the honour which Sir Clements Markham has received.

The Paper read was:—

"Journey in North-Eastern Sudan." By J. Theodore Bent, Esq.

Anniversary Meeting, June 15, 1896.—Sir CLEMENTS MARKHAM, K.C.B., F.R.S., President, in the Chair.

At the commencement of the proceedings, the Honorary Secretary, Major Darwin, read the rules which govern the business of the Meeting.

The President next appointed Mr. S. W. Silver and Mr. H. Rassam scrutineers for the ballot about to take place.

ELECTIONS.—*Lieut. Edward G. Alston; F. Bissenbuger; Adolphus N. Cohen; George J. Aitcheson Danford; Lieut. William Elliott, R.N.R.; Rev. Walter K. Firminger, B.A.; Henry Flemming Hibbert; Cecil R. Livingstone Learmonth; J. C. E. Parke; Captain W. Sharpe (Inspector Frontier Police); Lieut. A. H. Tyler, R.E.*

The Annual Report of the Council was then read.

REPORT OF THE COUNCIL.

The Council have the pleasure of submitting to the Fellows the following Report on the general and financial condition of the Society:—

Membership.—The number of Fellows elected during the year ending May 11, 1896, was 230, and nine Honorary Corresponding Members. In the previous year, 1894–95, the total elections amounted to 210, and in 1893–94 the number was 240. Our losses have been, by death 84 (besides 2 Honorary Corresponding Members), by resignation 49, and by removal on account of arrears of subscription 57; making a total increase of membership for the year of 47. In the year 1894–95 there was an increase of 12, in 1893–94 an increase of 29. The total number of Fellows on the list (which does not include those (46) who have been elected but have not yet paid the fees, and exclusive of Honorary and Honorary Corresponding Members) on May 13 was 3744.*

Finance.—As will be seen by the annexed Balance Sheet, the total net income for the Financial year ending December 31, 1895 (*i.e.* exclusive of balance in hand) was 10,209*l.* 11*s.* 8*d.*, of which 7458*l.* consisted of entrance fees and subscriptions of Fellows. In the previous year, 1894, the total net income was 9853*l.* 4*s.* 6*d.*, and the amount of subscriptions, etc., 6852*l.* 10*s.*; in 1893, the two totals were 11,050*l.* 2*s.* 1*d.* and 7458*l.* 10*s.* respectively.

The net expenditure for the past year (*i.e.* exclusive of balance in hand) was 10,057*l.* 10*s.* 6*d.* The net expenditure in 1894 was 9583*l.* 0*s.* 5*d.*; in 1893, 11,584*l.* 2*s.* 3*d.*

The Finance Committee of the Council have held, as usual, meetings during the year, supervising the accounts of the Society. The Annual Audit was held on April 21 last, the Auditors being, on behalf of the Council, G. S. Mackenzie, Esq., and W. M. Beaufort, Esq., and on behalf of the Fellows at large, Sir Rawson Rawson and J. Duncan Thomson, Esq. The cordial thanks of the Council and Fellows are due to these gentlemen for having freely devoted their valuable time to this important task. At the end of their labours the Auditors drew up the following Report to the Council:—

Auditors' Report.—"We have examined the Balance Sheet, and certify that in our opinion it is a full and correct statement, properly drawn up, so as to exhibit a true view of the Receipts and Expenditure of the Royal Geographical Society, as shown by the books of the Society, which have been checked with the Vouchers.

* It will be observed that the elections are given for the year ending May 11, the accounts for the year ending December 31.

"The total receipts in 1895, 10,209*l.*, show an increase of 357*l.* over those of 1894; they exceeded the estimate by 369*l.* The Expenditure, 10,057*l.*, compared with the expenditure of 1894, shows an increase of 474*l.*, but it fell short of the receipts by 152*l.*

"Comparing the details with those of the previous year, the only noteworthy change on the Receipts side is that of Life Compositions, which show an increase of 426*l.* There had been a large falling off under this head in 1894. The only material changes on the expenditure side were a new disbursement of 723*l.* upon printing the Library Catalogue, an increase of 363*l.* on account of special meetings and annual soirée, and a decrease of 231*l.* in the cost of the *Journal*.

"The balance in hand at the commencement of the year was 295*l.* 10*s.*, and at the close, 447*l.* 3*s.* 2*d.*, with a decrease of ordinary arrears.

"The following statement shows the ordinary net Receipts and Expenditure of each of the last five years, exclusive of Balances, Investments, and the cost of altering the premises:—

	Net Receipts.	Net Expenditure.	Difference.
1891	8,323	8,171	152 +
1892	9,300	9,012	288 +
1893	11,051*	11,584†	533 −
1894	9,853	9,583	270 +
1895	10,209	10,057‡	152 +

"The Arrears of Subscriptions have fallen from 1418*l.* to 1308*l.*

"The par value of the Investments, certified by the Society's Bankers and the Bank of England to be in their possession, which stood at 20,148*l.* 0*s.* 5*d.* at the close of 1894, stand at 20,481*l.* 0*s.* 5*d.* at the close of 1895, the increase arising out of the conversion of North-Eastern Debenture Stock.

"The market value of the stocks held has increased from 26,424*l.* 17*s.* 6*d.*, in April, 1895, to 28,309*l.* 10*s.* 4*d.* on April 16, 1896.

"The Total Assets of the Society, estimated in 1894 at 47,287*l.* 7*s.* 6*d.* (exclusive of the Library and the Society's Publications in Stock), may now be estimated at 49,279*l.* 13*s.* 6*d.*

(Signed) "George S. Mackenzie,
"W. M. Beaufort,
"J. D. Thompson,
"Rawson W. Rawson,
} *Auditors.*

"*April* 21*st*, 1896."

* Including Lord Derby's Legacy of £1000. † Chief excess on Publications.
‡ Chief increase on Library Catalogue.

Receipts. **BALANCE SHEET FOR THE YEAR 1895.** *Expenditure.*

1895.	£ s. d.	£ s. d.	1895.	£ s. d.	£ s. d.
Balances in Bankers' hands, Dec. 31, 1894 ..	275 8 6		*House:*—		
Accountant's	20 1 6		Taxes and Insurance ..	114 17 10	
		295 10 0	Coals, Light and Water	105 10 7	
Subscriptions:—			Repairs	90 7 4	
Arrears	434 0 0		Office Keeper	130 0 0	
For the current year ..	4192 0 0		Miscellaneous	57 5 7	
Paid in advance	814 0 0		*Office:*—		498 1 4
		5440 0 0	Salaries	1008 0 0	
Entrance Fees	.. ..	1040 0 0	Stationery	122 11 3	
Life Compositions	.. ..	978 0 0	Miscellaneous Printing	181 12 4	
Parliamentary Grant ..	.. ..	500 0 0	Miscellaneous	225 8 8	
Royal Premium	.. ..	52 10 0	*Library:*—		1537 12 3
Rent of Shop	.. ..	86 0 0	Salaries	418 13 6	
Publications:—			Books and Binding ..	134 8 6	
Advertisements in *Journal*	495 15 0		Library Catalogues ..	240 0 0	
Sale of *Journal* and *Proceedings*	547 6 11		Printing Library Catalogues	623 5 6	
Sale of 'Hints to Travellers'	54 7 0		Gratuity to Librarian (Library Catalogue)	100 0 0	
Other Publications ..	77 8 10		Miscellaneous	48 15 8	
		1174 17 9	*Map-room:*—		1565 1 8
Payments for Scientific Instruction	.. ..	50 0 0	Salaries	552 0 0	
Educational Lectures ..		20 4 6	Purchase of Maps, etc. .	32 5 9	
Sale of Soirée Tickets ..	.. ..	35 5 0	Repairs to Instruments	55 9 6	
Loan of Diagrams and Slides	.. ..	3 7 0	Miscellaneous	64 7 3½	
Payments in error	.. ..	38 16 2	*Map-Drawing Room:*—		704 2 6½
			Salaries	450 0 0	
Dividends:—			Miscellaneous	7 4 9	
North-Eastern Railway 3 per Cent. Debenture Stock .. .. 1333*l.*	38 13 4		*Meetings:*—		457 4 9
Great Indian Peninsula Railway 5 per Cent. Stock .. .. 4850*l.*	272 14 1		Evening Meetings ..	182 18 1	
Great Western Railway 4½ per Cent. Stock [Davis bequest] 1800*l.*	73 19 0		Anniversary Dinner and Soirée	299 0 0	
London and North-Western Railway 3 per Cent. Stock [Murchison bequest] 1334*l.*	38 13 8		Hand Maps	44 4 10	
			Miscellaneous	266 9 6	
Caledonian Railway 4 per Cent. Preference Stock .. .. 2000*l.*	77 6 8				792 12 5
Norwegian 3½ per Cent. Bonds .. .. 1000*l.*	33 16 8		*Medals and other Awards*	.. ..	231 17 0
New Zealand 4 per Cent. Stock . 1000*l.*	38 13 4		*Engraving New Diploma for Honorary Members*	.. ..	19 0 0
New South Wales 3½ per Cent. Stock [Gill Memorial] 1028*l.* 5*s.* 6*d.*	34 15 10		*Education:*—		
India Stock .. 1000*l.*	31 8 4		Scientific Instruction ..	119 10 0	
India 3½ per Cent. Debentures . 1000*l.*	32 0 5		Oxford and Cambridge Universities	375 0 0	
Consols . 1064*l.* 10*s.* 3*d.*	28 6 4		Oxford Studentship ..	50 0 0	
,, [Peek Fund] 1000*l.*	28 7 11		Owens College	50 0 0	
,, [Back bequest] 561*l.* 0*s.* 8*d.*	14 18 4		Educational Prizes ..	116 5 0	
,, [Trevelyan bequest] 516*l.* 4*s.* 0*d.*	13 10 8		Educational Lectures ..	126 2 0	
Metropolitan 3½ Consols [Derby Legacy] 1000*l.*	3 16 8				835 17 0
			Publications:—		
			Printing *Journal*	945 16 11	
			Postage and Addressing	498 17 11	
			Separate copies	39 7 0	
			Maps	531 2 7	
			Illustrations	136 17 9	
			Payments to Contributors	300 0 0	
			Editor of Publications ..	200 0 0	
			Index to *Proceedings* ..	50 0 0	
			Miscellaneous	149 2 8	
					2851 4 10
			'Supplementary Papers' —Printing	53 15 3	
			Maps, Illustrations & Binding	119 10 10	
					173 6 1
			Expeditions:—		
			Grant to Mr. J. T. Bent	100 0 0	
			Instruments	136 15 3	
					236 15 3
			Alterations to House ..	.. ..	33 3 4
			Messrs. Fox & Bousfield (fees in connection with search for new premises)	.. ..	105 0 0
			Payments in error returned	.. ..	17 0 6
			Balance in Bankers' hands, Dec. 31, 1895	441 11 11	
			Do. Accountant's do.	5 11 3½	
					447 3 2½
		£10,505 1 8			£10,505 1 8

E. L. S. COCKS,
Treasurer.

Audited and found correct, April 25, 1896.

W. M. BEAUFORT,
GEORGE S. MACKENZIE,
RAWSON W. RAWSON,
J. D. THOMSON.
} *Auditors.*

STATEMENT showing the RECEIPTS and EXPENDITURE of the Society from the Year 1848 to December 31, 1895.

	Year.	Cash Receipts within the Year.	Cash Amounts invested in Funds.	Deducting Amounts invested in Funds; actual Expenditure.
		£ s. d.	£ s. d.	£ s. d.
[1] Includes Treasury Grant of 1000*l.* for the East African Expedition.	1848	696 10 5	.. ..	755 6 1
	1849	778 3 0	.. ..	1098 7 6
	1850	1636 10 5	.. ..	877 2 10
	1851	1656 11 8	.. ..	906 14 7
[2] Includes Treasury Grant of 2500*l.* for the East African Expedition.	1852	1220 3 4	.. ..	995 13 1
	1853	1917 2 6	.. ..	1675 6 0
	1854	2565 7 8	.. ..	2197 19 3
[3] Includes Legacy of Mr. Benjamin Oliveira, 1506*l.* 17*s.* 1*d.*	1855	2584 7 0	.. ..	2636 3 1
	1856	[1] 3372 5 1	533 10 0	2814 8 1
	1857	3142 13 4	378 0 0	3480 19 9
[4] Includes Legacy of Sir Roderick Murchison, 1000*l.*	1858	3089 15 1	.. ..	2944 13 6
	1859	3471 11 8	950 0 0	3423 3 9
[5] Includes Mr. James Young's Grant for Congo Expedition, 2000*l.*	1860	[5] 6449 12 1	466 17 6	5406 3 7
	1861	4792 12 9	1358 2 6	3074 7 4
	1862	4659 7 9	1389 7 6	3095 19 4
	1863	5256 9 3	1837 10 0	3655 4 0
	1864	4977 8 6	1796 5 0	3647 7 10
[6] Includes Mr. James Young's Grant for the Congo Expedition, 1041*l.* 14*s.*	1865	4905 8 3	1041 5 0	4307 4 5
	1866	5085 8 3	1028 15 0	4052 15 0
	1867	5462 7 11	1029 6 6	3943 17 4
	1868	5991 4 6	1857 3 9	4156 17 10
[7] Includes Parliamentary Grant of 3000*l.* to Cameron Expedition.	1869	[7] 6859 16 0	2131 5 0	4646 0 8
	1870	[8] 8042 6 1	3802 6 0	3845 10 6
	1871	[8] 6637 3 7	1000 0 0	3726 4 4
	1872	[8] 8119 7 9	1999 4 6	5871 13 2
	1873	[9] 7761 18 10	2015 1 8	6697 12 6
[8] Includes Parliamentary Grant of 3000*l.* to Cameron Expedition, 1041*l.* 14*s.*	1874	[8] 9753 5 10	499 0 0	7876 2 3
	1875	7934 15 10	2002 7 6	5683 4 10
[9] Includes Legacy of Admiral Sir George Back, 540*l.*	1876	[9] 11611 11 8	.. ..	6870 13 1
	1877	[10] 7950 3 11	2538 2 0	8940 17 11*
[10] Includes Donation of 500*l.* by Mr. C. J. Lambert.	1878	[11] 8124 10 6	3000 0 0	6361 9 6
	1879	[12] 8979 14 10	1551 10 10	6990 14 2
[11] Includes Legacy of Admiral Sir George Back, 540*l.*	1880	8599 18 4	1567 5 1	8454 1 10†
	1881	8809 19 5	.. ..	8362 5 6‡
[12] Includes 1000*l.* received from Mr. B. Leigh Smith.	1882	[13] 8942 15 0	.. ..	8779 10 7
	1883	[14] 9599 9 0	1001 5 0	8624 2 11
[13] Includes 500*l.* on loan from Bankers.	1884	[15] 8964 11 7†	.. ..	9266 0 5
	1885	[16] 8738 12 3	.. ..	8555 3 10‡
[14] Includes 998*l.* 0*s.* 10*d.*, sale of India Debentures.	1886	[17] 7968 9 0	1000 0 0	7767 18 0‡
	1887	8007 16 3	.. ..	8493 10 3
[15] Includes Donation of 1000*l.* from Miss Gill.	1888	8053 5 0	.. ..	7908 18 6
	1889	8234 7 7	1000 0 0	7025 15 10
[16] Includes Legacy of the Earl of Derby, 1000*l.*			On deposit.	
	1890	9531 16 2	850 0 0	8218 5 10
	1891	8322 16 8	1000 0 0	8171 3 9
	1892	9299 18 7	.. ..	9012 7 5‡
[17] Includes Donation of 1000*l.* from Miss Gill.	1893	[18] 11050 2 1	1150 0 6	11584 2 3
	1894	9853 4 6	.. ..	9583 0 5
[18] Includes Legacy of the Earl of Derby, 1000*l.*	1895	10299 11 8		10057 18 6

* This sum includes the Special Parliamentary Grant transferred to the Cameron Expedition Fund in February, 1877.

† This amount includes the payment of two sums of 500*l.* each, contributed to the African Exploration Fund in this and the previous year.

‡ This sum includes the payment of 102*l.* 8*s.* to the African Exploration Fund; also 714*l.* 9*s.* 1*d.*, the final payment for Cameron Expedition Fund.

STATEMENT OF ASSETS.—December 31, 1895.

	£ s. d.	£ s. d.
Freehold House, Fittings, and Furniture, estimated (exclusive of Map Collections and Library insured for 10,000*l.*)	.. ..	20,000 0 0
Investments (amount of Stock), as detailed in the above Report of the Auditors, valued April last at	.. ..	28,309 10 4
Arrears due on December 31, 1895, 1508*l.* Estimated at	.. ..	523 0 0
Balance at Bank	£441 11 11	
„ in Accountant's hands..	5 11 3	
		447 3 2
Total		£49,279 13 6

ESTIMATE FOR THE YEAR 1896.

Receipts.	£	s.	d.
Balance in Bankers' hands (less liabilities)	356	11	11
Subscriptions	5400	0	0
Entrance Fees	950	0	0
Life Compositions	700	0	0
Parliamentary Grant	500	0	0
Royal Premium	52	10	0
Rent of Shop	86	0	0
Publications	1200	0	0
Payments for Scientific Instruction	50	0	0
Payments made in error	40	0	0
Loan of Diagrams and Slides	5	0	0
Sale of Soirée Tickets	35	0	0
Sale of *Proceedings* (Old Series)	24	0	0
Dividends	800	0	0
Total	£10,199	1	11

Expenditure.	£	s.	d.
House	470	0	0
Office	1458	0	0
Library	803	0	0
Map Room	708	0	0
Map-Drawing Room	458	0	0
Meetings	727	10	0
Medals and other Awards	200	0	0
Education	770	0	0
Publications:			
Journal	3040	0	0
'Supplementary Papers'	350	0	0
Index to Proceedings	25	0	0
Expeditions	350	0	0
Purchase of the late Captain Parker Snow's papers	100	0	0
Payment towards the International Geographical Congress	400	0	0
Payments in error returned	25	0	0
Balance available for contingencies	313	19	11
Total	£10,199	1	11

Publications.—The monthly *Journal* has been issued with regularity throughout the year; the twelve numbers for 1895 forming two volumes of 1276 pages, illustrated by 56 maps and 114 illustrations. The total cost of the edition of 5500 copies (including 498*l.* 17*s.* 11*d.* for free delivery to Fellows and Institutions) was 2801*l.* 4*s.* 10*d.* From this is to be deducted the amount of 1043*l.* 1*s.* 11*d.* received from sale of copies to the public and from advertisements. The sum of 173*l.* 6*s.* 1*d.* was expended on 'Supplementary Papers.'

Library.—During the past year 980 books and pamphlets, in addition to serial publications, have been added to the Library—833 by donation, 147 by purchase; 566 pamphlets have been put in boards by the Society's map-mounter, and 433 volumes have been bound. The sum of 64*l.* 14*s.* 1*d.* has been expended on books, and 69*l.* 9*s.* on binding.

The accessions of new books and the titles of articles in geographical publications are published monthly in the *Geographical Journal*. A large number of

works was presented to the Society by members of the Sixth International Geographical Congress which met in 1895. The Society purchased the collection of Arctic MSS. accumulated by the late Captain Parker Snow, including an extensive chronology and bibliography of Arctic travel. These works are now being arranged in the Library.

The experiment of keeping the Library open on Saturday afternoons has been discontinued on account of the small number of Fellows who availed themselves of the opportunity; but, during the session, the Library has been kept open on meeting nights until 8.15 p.m.

The *Subject Catalogue* has been steadily proceeded with. The titles of all books and pamphlets mentioned in the Authors Catalogue (down to 1893), and the titles of all geographical books or articles in periodicals since 1892 to the present date, have been cut out and pasted on slips, which are partially arranged as a nucleus for the Subject Catalogue. In addition a large number of volumes of old periodicals has been gone through, and the titles written on cards. These include all the Russian and most of the Scandinavian and Hungarian works. In the systematic plan now adopted, the series of Transactions and periodicals are being worked through in the order in which they are enumerated in Appendix III. of the Authors Catalogue, those published in Africa and America being now completed. The total number of title-slips for the Subject Catalogue—accumulated up to May 20—was 38,878.

Press-marking.—The greater part of the Library has been rearranged, the books press-marked, and the press-marks entered in a copy of the Catalogue for convenient reference.

Scientific Purposes Grant.—During the past year 30 intending travellers have received instruction from Mr. Coles, in Practical Astronomy, in the Society's Observatory, and in surveying with the theodolite, prismatic compass, and plane-table, in the country, and 401 hours have been devoted to teaching.

Instruments to the value of 324*l.* 17*s.* 6*d.* have been lent during the past year to the following travellers:—Mr. R. T. Günther (Italy), 13*l.* 10*s.*; Mr. F. W. W. Howell (Iceland), 21*l.* 16*s.*; Prof. J. Milne (Seismographic work in England), 39*l.* 15*s.*; Captain L. R. Arthur (Congo Region), 4*l.* 10*s.*; Captain H. H. P. Deasy (Central Asia), 76*l.* 10*s.*; Captain F. D. Lugard, D.S.O. (South Central Africa), 87*l.*; Mr. W. S. Bruce (for practice in Scotland), 8*l.* 8*s.*; Mr. R. T. Günther (for use in England), 3*l.* 13*s.* 6*d.*; Mr. H. C. Robinson (New Guinea), 65*l.* 3*s.*; Sir W. M. Conway (Spitzbergen), 69*l.* 15*s.*

The instruments lent to the following gentlemen have been returned during the past year, with the exception of those which have been lost:—Captain Cayley Webster (New Guinea), 1893; Mr. J. T. Last (Madagascar), 1894; Sir C. M. Macdonald (Niger Region), 1891; Mr. F. W. W. Howell (Iceland), 1895; Rev. C. H. Robinson (West Africa), 1893; Lieut. F. W. Green, R.A. (Asia Minor), 1894; Lieut. Coningham (Persia), 1893; Dr. Donaldson Smith (East Central Africa), 1894; Mr. St. George R. Littledale (Central Asia), 1894; Prof. J. Milne (Seismographic work in England), 1895; Mr. R. T. Günther (Italy), 1895.

The following is a list of travellers who still have instruments lent to them in their possession:—Mr. E. Douglas Archibald (for cloud observations in England), 1885; Mr. T. Bevan (New Guinea), 1887; Sir H. H. Johnston (British Central Africa), 1889 and 1894; Rev. A. Hetherwick (South-East Africa), 1891; Dr. D. Kerr Cross (South-East Africa), 1891; Mr. C. W. Campbell (Korea), 1893; Mr. J. C. White (Sikkim), 1893; Mr. R. M. W. Swan (South-East Africa), 1893; Mrs. Bishop (Korea), 1893; Mr. R. T. Coryndon (Mashonaland), 1894; Dr. Forsyth Major (Madagascar), 1894; Mr. S. Vandeleur, Scots

Guards (Uganda), 1894; Mr. C. M. Woodford (Pacific Islands), 1894; Captain A. St. H. Gibbons (South Central Africa), 1895; Mr. F. C. Selous (South Central Africa), 1895; Sir William Macgregor (British New Guinea), 1895; Captain L. R. Arthur (Congo Region), 1895; Captain H. H. P. Deasy (Central Asia), 1896; Captain F. D. Lugard, D.S.O. (South Central Africa), 1896; Mr. R. T. Günther (for plotting work in England), 1896; Mr. W. S. Bruce (for practice in Scotland), 1896; Mr. H. C. Robinson (New Guinea), 1896; Sir W. M. Conway (Spitzbergen), 1896.

Map Room.—The accessions to the Map Room Collection during the past year comprise 826 Maps on 2002 sheets; 49 Atlases (including continuations) containing 1166 sheets of Maps, 1212 Photographs, 6 Sketches, and 415 Lantern Slides. Of these, 46 Maps on 98 sheets, 17 Atlases, 74 Photographs, and 175 Lantern Slides have been purchased.

Most of the important donations to the Map Room Collection during the past year have been mentioned in the *Geographical Journal*, but in addition to these, Mr. H. Yates Thompson has presented the following atlases: French edition of Mercator's Atlas, published at Amsterdam, 1613; Ortellius' Theatrum Orbis Terrarum, 1579; and Sr. Ayrouard's 'Recüel de plusieurs Plans des Ports et Rades et de quelquez Cartes Particulieres de la Mer Mediterranean,' 1732 to 1746. Several of the collections of maps sent for exhibition at the meeting of the International Geographical Congress last year have also been presented by the exhibitors.

PRESENTATION OF THE ROYAL MEDALS AND OTHER AWARDS.

The PRESIDENT: Sir Henry Norman has kindly undertaken to receive the Founders' Medal, in Sir William MacGregor's absence. The Founders' Medal has been adjudicated to Sir William MacGregor, Lieutenant-Governor of New Guinea, for his long-continued services to geography, both in the interior and along the coast-line of that dependency. He has not only examined every inlet and bay, and every island, explored all the rivers of his government, and ascended the Owen Stanley range; but he has fixed his positions astronomically, and has mapped the details with so much assiduity and ability, and with such extraordinary zeal under very trying circumstances, that the Council has had no hesitation whatever in awarding to him the highest honour the Society has in its power to bestow. Sir William is still actively engaged in the same useful work, and perhaps this recognition ought to have come earlier; but I trust that it will give him satisfaction, and that he will rejoice to be assured of the sympathy of his brother geographers in England at a moment when he is still in the midst of his arduous labour. No one can be better acquainted, Sir Henry Norman, with the usefulness and importance of Sir William MacGregor's work than yourself, who was Governor of Queensland at the time; it is, therefore, appropriate that I should ask you to receive the medal for Sir William MacGregor, which I now have the pleasure of placing in your hands.

General Sir HENRY NORMAN: It is with very great pleasure indeed that I have received the Gold Medal of the Royal Geographical Society on behalf of Sir William MacGregor, and I am quite sure he will be very gratified at its receipt. As most of you are aware, the government of British New Guinea is immediately subordinate to the government of Queensland, and, having been governor of Queensland from within a few months of Sir William's arrival until the end of last year, I am in a position to thoroughly endorse all that your President has said. I am well aware of the very great services rendered to geography and to his country by Sir William MacGregor. It would have been quite impossible for these explorations to be carried out, or the many reports which have been made to be prepared, by any one who did not possess a most robust constitution, absolute fearlessness, entire disregard of hardships, great tact in the management of natives, and most

extensive scientific knowledge. Sir William MacGregor possesses all these qualifications. He has made numerous reports, all of which are published as they come in by the government of Queensland as parliamentary papers, but I am afraid most of them are not very readily accessible at present to the public. I trust at some no very distant date Sir William MacGregor will have the leisure to put all these reports into one book, which I am sure will be of great interest to the public, because they seem interested in the great territory of British New Guinea, which he has administered, and it will show them what a very great public service Sir William MacGregor has rendered during the last eight years.

The PRESIDENT: Mr. Littledale, the Council has awarded to you the Patron's Medal, not only as the traveller who has done the most important piece of geographical work during the last year, but as one who has worked for the objects of this Society with remarkable success and zeal during a very much longer period. You did valuable work and brought fresh information to us after your journey across the Pamirs in 1890. In 1893, your memorable journey from Kokhan to Peking included the examination of a considerable area of previously unknown country. Last year I consider that you surpassed all your previous efforts by crossing the Kuenlun, and traversing the whole of the great plateau of Tibet from north to south under difficulties of no ordinary character. It was not only as an intrepid traveller that the grant was made to you, but it was for having so diligently fixed your positions under great difficulties day by day, and for having mapped your routes with great care, that the Council was so unanimous when your name came before them for recognition. You have proved yourself to be not only a traveller, but a scientific geographer, and as such I have the very greatest pleasure in placing in your hands the Patron's Medal of this Society.

Mr. ST. GEORGE LITTLEDALE: I must thank you for the great honour you have done me in presenting this medal and the flattering manner you have spoken of my map. The merits of that map, if merits there be, are owing, in the first place, to the careful instruction I received from Mr. Coles, who taught me how to use the instruments kindly lent by this Society; also, in the second place, to my wife and Mr. Fletcher, who, no matter how bad the weather, or how hard the march had been, were always ready to sit up and take the times of the observations. How correctly they took them, Mr. Coles and Mr. Scharbau have given evidence. I must again thank you for the compliment you have paid me.

The PRESIDENT: Sir Henry Thuillier, your hereditary interest in the Indian surveys, and your own long distinguished service in connection with them, makes it especially appropriate that you should receive the Murchison Grant from me, for transmission to its recipient. Yusuf Sharif, of whom Colonel Holdich speaks in the highest terms, has been selected for the Murchison Grant, because he is the first native surveyor who acted entirely on his own resources and his own responsibility. He has conducted a scientific survey through a most difficult and dangerous country with success, from Makran to Bandar Abbas; and that is not the only useful work he has done for geography. He thus takes a place among those distinguished Indian surveyors whose valuable work has been from time to time recognized by this Society. I now have great pleasure in handing the Murchison Grant to Sir Henry Thuillier. The Gill Memorial and the Back Grant have been awarded to two very active and energetic officers connected with the Canadian Survey, Mr. Low and Mr. Tyrrell, the former for his five exploring journeys in Labrador, and the latter for two interesting expeditions into the Barren Grounds of North-East Canada. The form which the memorials will take has been, at their request, a gold watch and a silver cup. The Cuthbert Peek Grant has been awarded to Mr. Alfred Sharpe. After an examination of all his work and of the

services he has rendered to geography, the Council unanimously decided he was deserving of it, and their examination was undertaken at the request and recommendation of Sir John Kirk. Mr. Alfred Sharpe has made several very interesting journeys in Central Africa, and has always forwarded to our *Journal* valuable and full reports.

The Ballot for the New Council.

The President then announced that, according to the report of the scrutineers, the list as prepared by the Council had been duly elected.

The list is as follows, the names of new members, or those who change office, being printed in *italics* :—

President :—Sir Clements Markham, K.C.B., F.R.S., F.S.A. *Vice-Presidents :* Hon. George C. Brodrick; Right Hon. Geo. N. Curzon, M.P.; Sir George D. Taubman Goldie, K.C.M.G.; *Sir Rawson W. Rawson*, K.C.M.G., C.B.; General R. Strachey, R.E., C.S.I., F.R.S.; Rear-Admiral W. J. L. Wharton, F.R.S. *Treasurer :* Edward L. Somers Cocks. *Trustees :* Right Hon. Sir John Lubbock, Bart., F.R.S., M.P.; Cuthbert E. Peek. *Secretaries :* Major Leonard Darwin, R.E.; *James F. Hughes. Foreign Secretary :* Sir John Kirk, K.C.B., G.C.M.G., F.R.S. *Councillors :* W. M. Beaufort; *Lord Belhaven and Stenton*; George Cawston; *Colonel J. Farquharson*; Wilfred Hudleston, F.R.S., F.G.S.; J. K. Laughton; *Right Hon. Lord Loch*, G.C.B., G.C.M.G., etc.; G. Sutherland Mackenzie; Rear-Admiral Albert Hastings Markham; A. P. Maudslay; *John Murray*, LL.D., F.R.S.; *General Sir Henry W. Norman*, G.C.B., G.C.M.G.; Howard Saunders; The Earl of Scarbrough; *P. L. Sclater*, F.R.S.; Rear-Admiral E. H. Seymour, C.B.; Major the Hon. M. G. Talbot; *Colonel Sir Henry R. Thuillier*, R.E., K.C.I.E.; Lieut.-Colonel J. K. Trotter, R.A.; Admiral Hon. W. J. Ward; Lieut.-Colonel C. M. Watson, R.E., C.M.G.

The President then delivered his annual address (see p. 1), after which General Sir Henry Norman said: I have great pleasure in proposing a vote of thanks to Sir Clements Markham for his able and comprehensive Presidential address, from which we feel assured that a great deal has been done during the year to advance geographical science and geographical exploration, to all of which Sir Clements Markham has lent most valuable aid and assistance. I will only make one remark in reference to what we hope will take place, and which is, I think, a very general hope among the more enlightened part of the community in Australia—that an Antarctic expedition should be fitted out by her Majesty's Government. As Sir Clements Markham has shown, not only to-day, but in the paper previously printed, it is almost impossible to expect satisfactory results from such an expedition unless it is a Government expedition, and I hope by this time next year that the Government will have acceded to the wish, which I believe almost all geographers will express in favour of the expedition. In moving this vote of thanks, I think you will all desire that I should, on your behalf, congratulate Sir Clements Markham on the distinction her Majesty has been pleased to confer upon him for the very great services which he has rendered, and which have been beneficial to the empire, and which have not altogether been confined to those undertaken in support of geographical science. I beg to propose a vote of thanks to Sir Clements Markham.

Mr. S. W. Silver: I have the pleasure to second the vote of thanks. In doing so, I think we may say that we have listened to one of the most interesting addresses we have had for twenty-five years. It gives me very great pleasure, therefore, to second the motion which has been made, and I cannot do so without making reference to that well-earned recognition on the part of the Government to our President of his interest in the welfare of the nation during a long life of utility and advantage.

He has been the active instrument in transferring the invaluable Cinchona plant from South America to India, a circumstance with which all interested, directly or indirectly, with commerce must have identified his name. I beg, sir, to second the vote of thanks.

The PRESIDENT: I have to thank Sir Henry Norman and Mr. Silver for their kindness, and the meeting for the way their proposal was received. I think I may, without breach of confidence, say that I have been informed why this honour was conferred, and why our patron, her Majesty the Queen, has thought fit to bestow it upon me. I may tell you that it was, at all events, not wholly unconnected with the interest her Majesty, as patron, has always taken in the welfare of this Society.

THE ANNUAL DINNER.

The annual dinner of the Society took place on the evening of June 15, in the Whitehall Rooms of the Hôtel Métropole. Sir Clements Markham, K.C.B., F.R.S. (the President), was in the chair, and among those present were the Danish Minister, Lord Wenlock, Lord Monkswell, General Sir Francis Scott, Comte Henri de Bizemont, the Belgian Minister, Sir G. Taubman-Goldie, Admiral Sir F. Bedford, General Sir H. W. Norman, the Swedish Minister, Admiral the Hon. W. J. Ward, Sir Steuart Bayley, Sir T. Sanderson, Sir Montagu F. Ommanney, Sir Graham Bower, Mr. Moberly Bell, Admiral A. H. Markham, Lord Belhaven and Stenton, Sir Courtenay Boyle, Sir E. Maunde Thompson, Mr. Thiselton-Dyer, General Sir J. Hills-Johnes, the Hon. G. C. Brodrick, General Markham, Colonel Pennycuick, Mr. Gosch, Mr. Littledale, Mr. Preston of Moreby, Sir Rawson W. Rawson, Mr. W. J. Courthope, Mr. Richmond, R.A., Mr. Rollins, Sir W. H. Flower, Mr. J. Bramston, Sir A. Adderley, Mr. Clement Royds, M.P., Mr. E. G. Ravenstein, Mr. C. E. Borchgrevink, General Lees, General Sir H. Havelock-Allan, Major L. Darwin, Mr. J. F. Hughes, Sir G. S. Meason, Sir Whitaker Ellis, Mr. Foster (Secretary of the Hakluyt Society), Dr. H. Woodward, Mr. Bosworth Smith, Sir Juland Danvers, Sir W. de Souza, and Sir W. L. Booker.

The PRESIDENT, having proposed the usual loyal toasts, next gave that of "The Navy and Army," responded to by Admiral Sir F. Bedford and General Sir F. Scott.

The PRESIDENT next proposed the toast of "The Medallists," which was acknowledged by Mr. ST. GEORGE LITTLEDALE.

The PRESIDENT, in proposing the toast of "The Guests," referred to the services which had been rendered to science and civilization by Lord Wenlock and Colonel Pennycuick. He also spoke of Mr. Borchgrevink's forthcoming Antarctic expedition. Mr. Borchgrevink was about to go out in an English whaling vessel with the object of being landed at Cape Adare, on Victoria Land. He would be accompanied by a party of friends, and would be left in the Antarctic regions for the winter, to do all the exploration in his power. It was hoped that he would be taken off in the next season, and that valuable results would attend his pluck, his perseverance, and his energy. The Society would follow his proceedings with the utmost interest.

Lord WENLOCK and Comte HENRI DE BIZEMONT responded to the toast; and

Sir G. TAUBMAN-GOLDIE proposed the health of the President. In doing so he expressed the gratification which they all felt at the honour which the Queen had been pleased to confer on Sir Clements Markham.

The PRESIDENT acknowledged the compliment, and gave the toast of "The Officers of the Society."

Mr. KELTIE responded, and the proceedings then ended.

GEOGRAPHICAL LITERATURE OF THE MONTH.

Additions to the Library.

By HUGH ROBERT MILL, D.Sc., *Librarian*, R.G.S.

THE following abbreviations of nouns and the adjectives derived from them are employed to indicate the source of articles from other publications. Geographical names are in each case written in full:—

A. = Academy, Academie, Akademie.
Ann. = Annals, Annales, Annalen.
B. = Bulletin, Bollettino, Boletim.
Com. = Commerce, Commercial.
C. Rd. = Comptes Rendus.
Erdk. = Erdkunde.
G. = Geography, Geographie, Geografia.
Ges. = Gesellschaft.
I. = Institute, Institution.
J. = Journal.
M. = Mitteilungen.
Mag. = Magazine.
P. = Proceedings.
R. = Royal.
Rev. = Review, Revue, Revista.
S. = Society, Société, Selskab.
Sitzb. = Sitzungsbericht.
T. = Transactions.
V. = Verein.
Verh. = Verhandlungen.
W. = Wissenschaft, and compounds.
Z. = Zeitschrift.

On account of the ambiguity of the words *octavo*, *quarto*, etc., the size of books in the list below is denoted by the length and breadth of the cover in inches to the nearest half-inch. The size of the *Journal* is 10 × 6½.

ASIA.

Asia. *B.S. Khediviale G.* 4 *s.* (1896): 545-568. **Fukushima.**

M. le Comte Charles Zaluski. Communication sur le voyage à cheval de Berlin à Wladiwostok accompli par le Colonel Foukou-Shima, de l'armée japonaise.

Ceylon. *J.R. Colonial I.* **27** (1896): 436-471. **Clarence.**

One Hundred Years of British Rule in Ceylon. By L. B. Clarence.

India—Vijayanagar. *J.S. Arts* **44** (1896): 529-540. **Rolleston.**

The Deserted City of Vijayanagar. By Captain Charles Rolleston.

Indo-China. *C. Rd. S.G. Paris* (1896): 42-66. **Henri d'Orléans.**

Du Yunnam à l'Assam. Par le Prince Henri d'Orléans. *With Map.*

Indo-China. *Rev. Française et Exploration* **21** (1896): 129-135, 193-201. **Henri d'Orléans.**

Du Tonkin aux Indes par le Yunnan: Exploration du Prince Henri d'Orléans. *With Maps.*

Indo-China—Laos. *B.S.G. Commerc. Paris* **18** (1896): 263-281. **Malglaive.**

La pénétration au Laos par la brèche d'Aï-Lao, à propos d'une récente tentative. Par M. le capitaine de Malglaive. *With Map.*

Korea. *J. Anthrop. I.* **25** (1896): 340-361. **Landis.**

Mourning and Burial Rites of Korea. By E. B. Landis, M.D.

Korea—Atlas. **Cordier.**

Description d'un Atlas Sino-Coréen, Manuscrit du British Museum. (Recueil de Voyages et de Documents pour servir à l'Histoire de la Géographie depuis le XIII^e^ jusqu'à la fin du XVI^e^ siècle, publié sous la direction de MM. Ch. Schefer et Henri Cordier, Section Cartographique.) Par Henri Cordier. Paris: E. Leroux, 1896. Size 20½ × 13, pp. 14. *Facsimile Maps. Presented by the Author.*

Professor Cordier gives a full description with reproductions of several plates of a manuscript Chinese atlas of Korea dating from the eighteenth century, and now in the British Museum, discussing the names which occur on the maps.

Malay Archipelago. *Rev. G.* **38** (1896): 337-342. **d'Estrey.**

Todjo, Posso, Saouson et Mooeton, quatre petits États de l'Archipel Indien, explorés par le baron van Hoevell. Par le Dr. Comte A. Meyners d'Estrey.

Malay Archipelago—Borneo. **Young.**

Tijds. Indische Taal-, Land- en Volkenkunde **38** (1895): 499-550.

Bijdrage tot de geschiedenis van Borneos Westerafdeeling. Door J. W. Young.

Malay Archipelago—Sumatra. **Klerks.**

Tijds. Indische Taal-, Land- en Volkenkunde **39** (1895): 1-117.

Geographisch en Ethnographisch opstel over de Landschappen Korintji, Sĕrampas en Soengai tĕnang. Door E. A. Klerks. *With Map.*

Malay States. *J.R. Colonial I.* **27** (1896): 420–433. **Swettenham.**

Discussion on "British Rule in Malâya." By F. A. Swettenham, C.M.G.

Mongolia—Buddhism. **Huth.**

Geschichte des Buddhismus in der Mongolei. Mit einer Einleitung: Politische Geschichte der Mongolen. Aus dem Tibetischen des Jigs-med nammk'a, herausgegeben, übersetzt und erläutert, von Dr. Georg Huth. Zweiter Teil: Nachträge zum ersten Teil, Uebersetzung. Strassburg: K. J. Trübner, 1896. Size 10½ × 7, pp. xxxii. and 456. *Price* 30 *mark. Presented by the Publisher.*

The German translation of the Tibetan text published by the author in 1892, with critical notes.

New Siberian Islands. *Ymer* **16** (1896): 79–100. **Nathorst.**

De Nysibiriska öarne. Öfversikt af där utförda forskningar och dessas resultat. Af A. G. Nathorst. *With Map and Plate.*

Northern and Eastern Asia. **Keane.**

Stanford's Compendium of Geography and Travel (New Issue). Asia. Vol. i. Northern and Eastern Asia. By A. H. Keane. London: E. Stanford, 1896. Size 8 × 5½, pp. xxiv. and 528. *Maps and Illustrations. Price* 15*s. Presented by the Publisher.*

Like the other volumes of the present issue of this Compendium, the changes have been of the most radical kind; the work, in fact, is a new one, giving an account of the geography of Asia at once accurate and up to date.

Persia. *J. Tyneside G.S.* **3** (1896): 220–227. **Goldsmid.**

Persia and Her Neighbours. By Major-General Sir Frederick J. Goldsmid, K.C.S.I., etc. *With Portrait.*

Siam. *J. Manchester G.S.* **11** (1895), (1896): 141–158. **Unsworth.**

An English Lady in Siam. By Mrs. (Captain) Unsworth. *With Map.*

Tibet. **Littledale.**

A Journey across Tibet, from North to South, and West to Ladak. By St. George R. Littledale. From the *Geographical Journal* for May, 1896. Size 10 × 6½, pp. 32. *Maps and Illustrations.*

Turkey in Asia. *Scottish G. Mag.* **12** (1896): 225–241. **Maunsell.**

Eastern Turkey in Asia and Armenia. By Captain F. R. Maunsell.

Western Asia. *Petermanns M.* **42** (1896): 49–58, 73–88. **Oppenheim.**

Zur Routenkarte meiner Reise von Damaskus nach Bardâd im Jahre 1893. Von Dr. Max Freiherrn v. Oppenheim. *With Map.*

Western Asia—Anthropological Researches. **Chantre.**

Recherches Anthropologiques dans l'Asie Occidentale. Missions Scientifiques en Transcaucasie, Asie Mineure et Syrie, 1890–1894. Par Ernest Chantre. Extrait des Archives du Museum d'Histoire Naturelle de Lyon, t. vi. Lyon: H. Georg, 1895. Size 15 × 11, pp. xviii. and 250. *Plates. Presented by the Author.*

Western Asia and Egypt. **Hogarth.**

A Wandering Scholar in the Levant. By David G. Hogarth. Second Edition. London: John Murray, 1896. Size 8 × 5½, pp xvi. and 206. *Map and Illustrations. Price* 7*s.* 6*d. Presented by the Author.*

This will be separately noticed.

AFRICA.

Abyssinia. **Vanderheym.**

J.-G. Vanderheym. Une Expédition avec le Négous Ménélik; vingt mois en Abyssinie. Paris: Hachette & Cie., 1896. Size 7½ × 5, pp. vi. and 206. *Map and Illustrations.*

Africa Pilot—Revised Supplement. ———

Revised Supplement, 1895, relating to the Africa Pilot, Part iii., third edition, 1889. London: J. D. Potter, 1895. Size 10 × 6, pp. 160. *Price* 1*s.* 6*d. Presented by the Hydrographic Office, Admiralty.*

This gives an account of the navigation of the ports on the African coast which have acquired new importance during the last few years.

Cape Colony—Hex River Mountains. **Marloth.**

Trans. South African Philosoph. S. **8** (1892–95), (1896): 86–92.

Some Scientific Results of an Excursion to the Hex River Mountains. By R. Marloth, PH.D., etc.

Cape Colony—Kimberley. *Trans. Geolog. S. South Africa* **1** (1896): 76–89. **Atherstone.**

Kimberley and its Diamonds. By W. Guybon Atherstone, M.D.

East Africa—Pangani River. *Petermanns M.* **42** (1896): 59–62. **Baumann.**

Der Unterlauf des Pangani-Flusses. Von Dr. Oscar Baumann. *With Map.*

Egypt. **Fircks.**

Aegypten, 1894. Von A. Freiherr v. Fircks. Zweiter Theil. Berlin: D. Reimer, 1896. Size 8½ × 6, pp. iv. and 290. *Presented by the Publisher.*

This volume deals with the land-laws, administration of justice, public health, religion (giving an account of the various religions and sects), finance, trade, commerce, and communications, and the work concludes with a bibliography in two parts, dealing respectively with ancient and modern Egypt.

Egypt and Western Asia. *Mem. S.G. Italiana* **5** (1896): 435. ——

Gl'itinerari Frediani, Belzoni e Drovetti. *With Map.*

French Congo—Clozel's Mission. *Ann. G.* **5** (1896): 309–321. **Herr, Barrat, Angot.**

Mission Clozel dans le Nord du Congo français (1894–95). Par M. le Dr. Herr. *With Map and Illustrations.*

Note sur les échantillons géologiques recueillis par M. le Dr. Herr au cours de la mission Clozel. Par M.M. Barrat.

Observations météorologiques recueillies par M. le Dr. Herr, . . . Par M. Angot.

Madagascar. *Rev. Scientifique* (4 *s*) **5** (1896): 552–557. **Grandidier.**

Madagascar il y a cent ans; les voyages de Mayeur. Par M. Alfred Grandidier.

This is noticed on p. 71.

Natal. *Contemporary Rev.* (1896): 846–859. **M'Master.**

The Highlands of Natal. By Emile M'Master.

Nile Valley. *Quarterly J. Geolog. S.* **52** (1896): 308–319. **Hull.**

Observations on the Geology of the Nile Valley, and on the Evidence of the Greater Volume of the River at a Former Period. By Prof. Edward Hull.
Also a separate copy. *Presented by the Author.*

Somali Coast. *Mem. S.G. Italiana* **5** (1896): 351–362. **Cecchi.**

Notizie geografiche e commerciali sul protettorato britannico della costa somala nel Golfo di Aden, nota del cap. Antonio Cecchi.

Somali Land. *Mem. S.G. Italiana* **5** (1896): 436–448. ——

La prima Spedizione Bóttego nella Somalia. *With Map.*

The map of Somaliland is reproduced on the scale of 1 to 4,000,000.

South Africa. *Petermanns M.* **42** (1896): 88–91. **Supan.**

Die politische Einteilung Südafrikas. Von Prof. Dr. A. Supan. *With Map.*

South Africa—Glacial Phenomena. **Schenck.**

Trans. Geolog. S. South Africa **1** (1896): 129–141.

On Glacial Phenomena in South Africa. By Dr. Adolph Schenck. Translated by Dr. Kieckhaefer.

NEW MAPS.

By J. Coles, *Map Curator*, R.G.S.

ARCTIC REGIONS.

Arctic Exploration. **U.S. Hydrographic Office.**

The Arctic Regions, with the Tracks of Search Parties and the Progress of Discovery. Compiled from the latest information, 1896. U.S. Department of the Navy, Bureau of Navigation. Published at Washington, D.C., April, 1896, at the

Hydrographic Office, Charles D. Sigsbee, Commander U.S. Navy, Hydrographer. 2 sheets. *Price* $1·00. *Presented by the U.S. Hydrographic Office.*

This is an exploration chart of the Arctic Regions, showing the progress of discovery. In some respects it is not complete, as, for instance, the discoveries of Davis and Frobisher are not indicated; neither are those of Richardson and Kendal to the east of the Mackenzie river shown. The discoveries of Franklin in 1826, to the west of the Mackenzie river, are attributed to Pullen in 1849. These are some of the inaccuracies; others could be pointed out, but for general purpose of reference it will doubtless be found useful.

EUROPE.

England and Wales. **Ordnance Survey.**

Publications issued since May 7, 1896.

1-inch—General Maps:—

ENGLAND AND WALES:—(revision), 217, 221, 236, engraved in outline; 330, 331, 332, 333, 334, 344, 345, hills engraved in black or brown, 1*s.* each.

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ENGLAND AND WALES:—**Yorkshire**, 7*a* S.E., 184 N.W., N.E., 1*s.* each.

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ENGLAND AND WALES:—**Berkshire** (revised), XLIV. 15; XLV. 10, 11, 12, 13, 14, 3*s.* each. **Durham** (revised), IV. 6, 10, 11, 14, 15; VI. 16; XI. 7, 8; XII. 1, 2, 5, 3*s.* each. **Essex** (revised), XLI. 14, 16; XLII. 13; L. 2, 4, 8, 12, 16; LI. 1, 5, 13; LVIII. 15; LXVI. 3, 3*s.* each. **Hampshire** (revised), IV. 15; V. 10, 11, 12, 13, 14, 15, 16; XI. 3, 4, 5, 6, 7, 8, 9, 10, 11, 14; XIX. 2, 6, 10, 16; XXII. 11, 15, 16; XXIII. 12, 16; XXX. 7, 12, 15, 16; XXXI. 1, 2, 3, 4, 5, 6, 7, 9, 3*s.* each. **Hertfordshire** (revised), XLV. 10, 3*s.* **Kent** (revised), XVI. 12, 3*s.* **Middlesex** (revised), VI. 10; VII. 3, 4; XIX. 14, 3*s.* each. **Surrey** (revised), X. 7; XI. 6, 15; XIII. 11; XVI. 12; XVII. 3, 7, 9, 11, 13, 14, 15, 16, 3*s.* each. **Wiltshire** (revised), LV. 11; LXI. 7, 15, 16, 3*s.* each.

Town Plans—10-feet scale:—

ENGLAND AND WALES:—**Newcastle, Gateshead and Environs** (revised), 60, 61, 62, 63, 64, 65, 72, 73, 74, 75, 87, 88, 92, 98, 100, 102, 107, 109, 112, 143, 144, 145. **Tynemouth, North and South Shields** (revised), 24, 72. **Wallsend, Jarrow and Environs**, 24, 2*s.* 6*d.* each.

———— 5-feet scale:—

London—Re-survey, VIII. 88; XV. 84, 86, 96; XVII. 4, 14, 15, 25, 2*s.* 6*d.* each. (*E. Stanford, Agent.*)

Germany. **Kgl. Preuss. Landes-Aufnahme.**

Karte des Deutschen Reiches. Scale 1: 100,000 or 1·3 geo. mile to an inch. Herausgegeben von der Kartogr. Abteilung der Kgl. Preuss. Landes-Aufnahme, 1895. Sheets: 272, Landsberg, a. d. W.; 274, Birnbaum; 352, Geldern. *Price* 1·50 *marks each sheet.*

West Prussia and Posen. **Langhans.**

Die Thätigkeit der Ansiedelungs-Kommission für die Provinzen Westpreussen und Posen, 1886–1896. Auf Grund amtlicher Angaben entworfen von Paul Langhans. Auf Vogels Karte des Deutschen Reiches in 1: 500,000 or 7·9 stat. miles to an inch. Gotha: Justus Perthes, 1896. Petermann's 'Geographische Mitteilungen,' Jahrgang, 1896, Tafel 9. *Presented by the Publishers.*

AFRICA.

South Africa. **Struben.**

A Geological Sketch-Map of Africa South of the Zambesi, 1896. Accompanied by Sections and Notes in Letterpress. By F. P. T. Struben, F.R.G.S. Discoverer of the Witwatersrand Gold Fields. On four sheets. Scale 1: 2,534,400 or 40 stat. miles to an inch. London: E. Stanford. *Price* £1 1*s.* *Presented by E. Stanford, Esq.*

The geological features of Africa south of the Zambesi, so far as they are known, are shown on this map, and sections along certain lines, which are indicated, are given. The map is accompanied by a pamphlet containing descriptive letterpress, in addition to which there are various notes on the map itself, and an explanation of the system of colouring employed.

AMERICA.

Mexico. **Comision Geografico-Exploradora.**

Carta General del Estado de S. Luis Potosi. Levantada por iniciativa du su Actual Gobernador, Gral. Carlos Diez Gutierrez, por la Comision Geografico-Exploradora. Mexico, 1894. Scale 1 : 250,000 or 4 stat. miles to an inch. 12 sheets. *Presented by Señor Don Enrique L. Gonzalez*

The scale on which this map is drawn is sufficiently large to admit of a considerable amount of detail being shown. The altitudes are given in metres, and all means of communication are laid down. On the different sheets of the map some useful statistical and geographical information is given in tabular form, together with insets showing the political divisions and geographical positions. The hill shading employed is effective, the rivers and streams are printed in blue, and the lettering clear.

AUSTRALIA.

Queensland **Pugh's Almanac.**

1. Map of Queensland, compiled and lithographed from official maps. Scale 1 : 3,066,000 or 48·5 stat. miles to an inch. Brisbane: Gordon & Gotch.

2. Brisbane and Suburbs.

Issued with Pugh's Almanac. Published for the proprietors by Gordon and Gotch, 1896. *Presented by the Queensland Government.*

South Australia. **Horn.**

Plan showing the Route of the Horn Scientific Expedition, 1894. Scale 1 : 846,800 or 13·5 stat. miles to an inch. Stanford's Geographical Establishment, London.

The most remarkable feature in this map is the parallel lines of sand-hills which occupy all the central portion of the map, and which have been drawn with regularity but seldom to be found in nature. The region explored by the Horn Scientific Expedition is situated nearly in the centre of the Australian continent, to the west of Alice Springs station and the telegraph line.

GENERAL.

Facsimile Maps **Marcel.**

Choix de Cartes et de Mappemondes des XIV^e^ et XV^e^ Siècles. Publié par Gabriel Marcel. Paris: Ernest Leroux, 1896.

This portfolio contains reproductions of the following maps: the Pisani map, Dulcert mappemonde, Mercia de Viladestes mappemonde, Soleri mappemonde. The Pisani has been reproduced by Jomard in his atlas, and others. The Dulcert map was purchased in Venice by M. Losuef, who has had eighty copies of it made, and from one of these the present facsimile has been taken. The Mercia Viladestes map has been known since 1806. It was purchased in 1857 by the Bibliothèque National for the sum of 800 francs. It is, however, not known how the map came into the possession of the person from whom it was purchased. The Soleri map bears the date of 1385, and has been very carefully described by MM. Amat di San Filippo and by Fernandez Duro, and also by M. Gabriel Marcel. These copies have been produced by a photographic process, the results being very satisfactory.

CHARTS.

Admiralty Charts. **Hydrographic Department.**

Charts and Plans published by the Hydrographic Department, Admiralty, during March and April, 1896. *Presented by the Hydrographic Department, Admiralty.*

No.	Inches.	
2050	m = 2·75	England, south coast:—Approaches to Spithead. 2*s.* 6*d.*
368	m = 1·0	Wales:—Barmouth to South Stack, including Carnarvon and Tremadoc bays. 3*s.*
1557	m = 3·6	Ionian sea:—Port Argostoli. 2*s.* 6*d.*
886	m = various	Plans in the Canary islands:—Rio strait, Port Cabras, Bocayna strait, Ports Naos and Arrecife. 2*s.* 6*d.*
421	m = 3·0	Harbours and anchorages on the east coast of Newfoundland:—Pilley island harbour and approaches. 1*s.* 6*d.*
424	m = 3·5	Cuba, north coast:—Port Matanzas. 1*s.* 6*d.*
538	m = 2·0 m = 8·0	Vancouver island:—Seymour narrows, Menzies bay. 1*s.* 6*d.*
425	m = 2·0	Africa, east coast:—Birikau river (part Durnford). 1*s.* 6*d.*
795	m = 0·25	Malacca strait:—Cape Rachado to Singapore. 3*s.*
1830	m = 0·04	Pacific ocean:—Ellice islands to Phœnix islands. 2*s.* 6*d.*
1107		Anchorages in the Society islands:—Plan added, Mopehá anchorage and Lagoon entrance.
186		Mazzara to Palma:—Plan added, Port Pantellaria.
193		Linosa island, Lampedusa island:—Plan added, Lampedusa harbour.

J. D. Potter, agent.

Charts Cancelled.

No.	Cancelled by	No.
2050 Spithead, and approach from the eastward.	New Chart. Approaches to Spithead . . .	2050
192 Lampedusa harbour.	New plan, on chart	193
1557 Port Argostoli.	New Chart. Port Argostoli	1557
886 Port Naos and Arrecife.	New Chart. Plans in the Canary islands . .	886
1852 Plan of Rio strait on this sheet.		
411 Plans of Port Matanzas and Matanzas anchorage on this sheet.	New Chart. Port Matanzas	424
580 Plan of Menzies bay on this sheet.	New Chart. Seymour narrows, Menzies bay . .	538
538 Seymour narrows.		
671 Plan of Port Durnford on this sheet.	New Chart. Birikau river (near Durnford) . .	425
795 *a*, *b*, Cape Rachado to Mount Formosa.	New Chart. Cape Rachado to Singapore . . .	795
796 Mount Formosa to Tanjong Bolus.		
1926 Waterloo bay.		

Charts that have received Important Corrections.

No. 1543, England, east coast:—Yarmouth and Lowestoft roads. 1447, Ireland, east coast:—Dublin bar and the river Liffey. 1352, France, north coast:—Dunkerque road. 2733, Iceland:—Portland to Snefells Jökel, etc. 325, North America:—St. Mary river from Mud lake to East Neebish. 324, North America:—St. Mary river from East Neebish to Iroquis point. 2754, North America, east coast:—Long island sound, Sheet 1. 2755, North America, east coast:—Long island sound, Sheet 2. 1714, Haïti:—Cape Haïti harbour. 1573, Honduras gulf with Zapotillos cays. 2627, Vancouver island:—Semiahamoo bay and Drayton harbour. 1897*b*, Vancouver island:—Victoria harbour. 1499, North America, west coast:—Cross sound to Kadiak island. 1500, North America, west coast:—Kadiak island to Siguam island. 2430, North America, west coast:—Queen Charlotte islands and adjacent coasts of British Columbia. 2464, Madagascar:—Nosi Andrianmitarika to Mananonoka point. 701, Madagascar:—Bombetoke bay. 378, Madagascar:—Maromanjo point to Makambytra bay. 8*b*, Red sea, Sheet 2. 833, Bay of Bengal:—Rangoon river and approaches. 507, Japan:—Go yo mai channel to Yezo strait. 93, Japan:—Akashi-no-Seto and its approaches. 1644, Bering sea:—Komandorski islands. 2764, Australia, east coast:—Coral sea and Great Barrier reefs, Sheet 2. 1807, Australia, north coast:—Gulf of Carpentaria, southern side. 1963, New Guinea:—Kiriwina or Trobriand islands. 97, Anchorages in the Solomon islands. 209, Anchorages in the Solomon islands. 1380, Pacific ocean:—New Caledonia, New Hebrides, and Loyalty islands.
(*J. D. Potter, Agent.*)

Pilot Charts. **U.S. Hydrographic Office.**

Pilot Charts of the North Atlantic and North Pacific Oceans for April, May, and June, 1896. Published monthly at Hydrographic Office, Bureau of Navigation, Department of the Navy, Washington, D.C. Charles D. Sigsbee, Commander U.S. Navy, Hydrographer. *Presented by the U.S. Hydrographic Office.*

PHOTOGRAPHS.

Victoria Falls. **Newnham.**

Twelve photographs (in three frames) of the Victoria Falls, Zambesi river, taken by F. J. Newnham, Esq. *Presented by F. J. Newnham, Esq.*

This series consists of twelve photographs of the Victoria Falls of the Zambesi and the neighbourhood. The views have been taken from various points, and convey a very good idea of the remarkable characteristics of this locality.

N.B.—It would greatly add to the value of the collection of Photographs which has been established in the Map Room, if all the Fellows of the Society who have taken photographs during their travels, would forward copies of them to the Map Curator, by whom they will be acknowledged. Should the donor have purchased the photographs, it will be useful for reference if the name of the photographer and his address are given.

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KHOKAND
1300
Ustarsa
Durmanche
Jamansar
Chandarau
Sokh R.
Kirk kiak
3800
Ushagar
Sargaldak
Shustonan
Kara-tube
Marghilan
Altin-ark
Ak-tube
Mamat
Gumian
Naukat
Khalmion
Urus bulak
Kan-djar
Okhna
Kirk
Shakhe-mardan
Kaschan P.
Sirb
Swrath P.
Alaudin M.s
Kuldin Tau M.s
Alaudin P.
Tash
Kara-kirk P.
13000
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Kantaus M.s
Malik M.s
Karanglik P.
Langar
Maidan
Austan
Kara-chuma R.
Kashka-su
Kara-kisak R.
Kara-kisak P.
Kara-su
Baburchak
Khaidarghan
Lashkar
Rhoja-atik
Uch kurghan
Jangi
Uch T.
Darwaskurghan
1890
Vashan
Bai mazar
Gambaz-mazar
Karamuk
7810
Bekbashi P.
Kara-sai
Kara-sai
Mukur
Ilgan
Manak P.
Dambaracha
Kara-tash
Kara-tash
Kara-tash P.
Kara-tash R.
Kara-tash
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Kara-tash

Kara kul
Ak tash P.
Kara R.
Suek R.
Kara kul
Suek
Kurk ab R.
Kash bel P.
Ala tube
Uch kul
Ak tash R.
Ulugal 4900
Ak tash
Kara kul R.
Chalanak R.
Chalanak
Ak tash R.
Kara kul R.
Kara gaik R.
Ikenaukat
Kara gaik
Kara gaik P.
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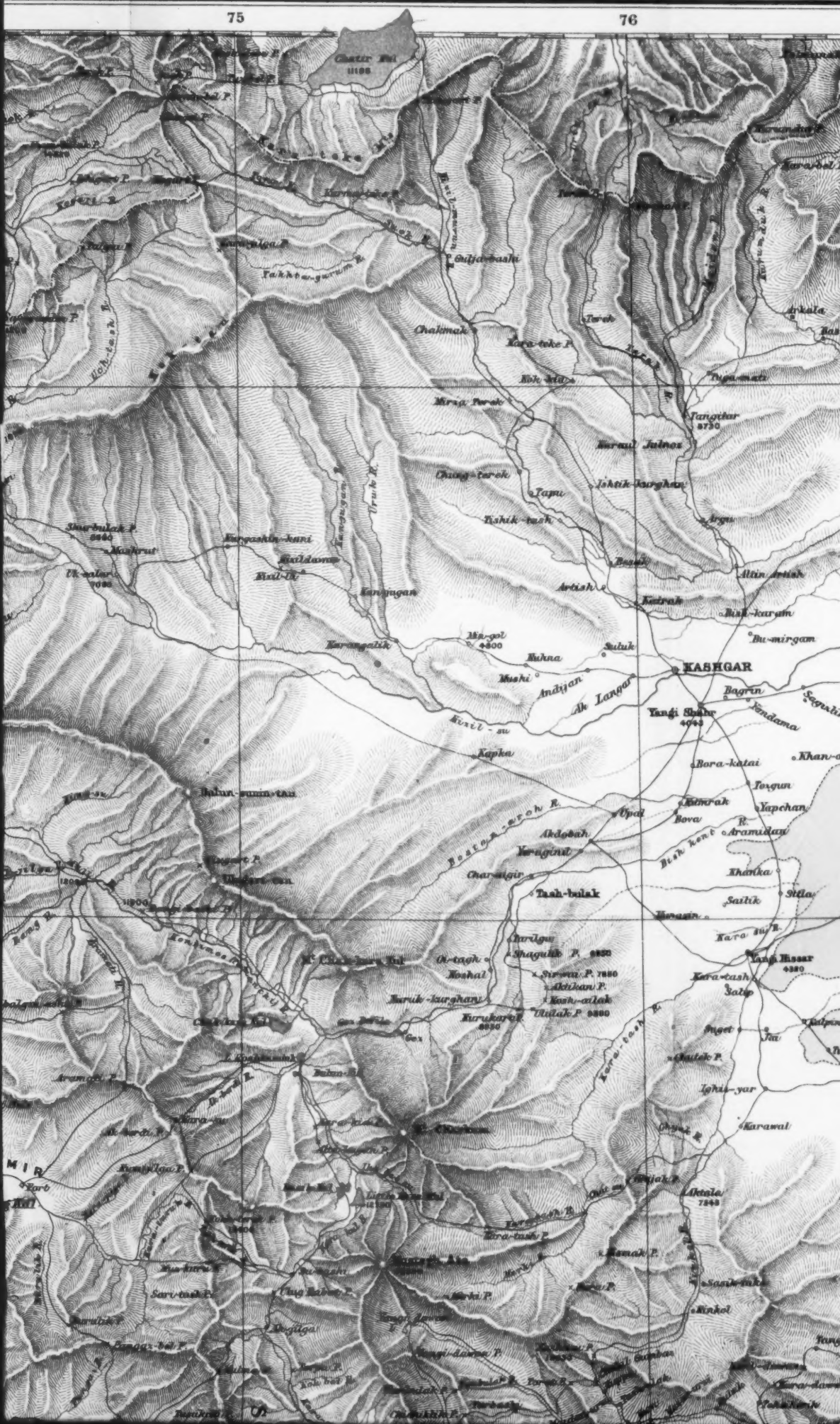
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76
KASHGAR
Yangi Shahr
4743
Yangi Hissar
4380
Tash-bulak
Chakmak
Kara-tekin R.
Kara-tekin
Kara-tekin P.
Kara-tekin R.
Kara-tash
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LIST OF AUTHORITIES CONSULTED IN THE COMPILATION OF THIS MAP.
A. P. Fedchenko 1868
G. W. Hayward 1868
R. Shaw 1869
The Havildar 1872
Capt. J. Wood 1872
Sir D. Forsyth 1873
Lieut. T. E. Gordon 1873
The Mullah 1873
Capt. H. Trotter 1873
N. A. Severtsoff 1877
A. F. Middendorf 1879
Dr A. Regel 1880
M. S. 1881
Col. H. Tanner 1881
Lieut. Benderski 1883
W. W. M'Nair 1883
Col. M. S. Bell 1886
Col. A. A. Bolsheff 1886
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P. E. Kossiakoff 1886
Col. R. G. Woodthorpe 1886
G. Bonvalot 1887
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Lieut. H. Bower 1890
Major C. S. Cumberland 1891
H. Dauvergne 1891
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Lieut.-Col. Grombchefski 1891
St. G. Littledale 1891
Lieut. J. M. Stewart 1891
Lieut. J. C. Tyler 1891
Capt. F. E. Younghusband 1891
Lieut. G. K. Cockerill 1893
Dr Sven Hedin 1894
Major-Gen. M. Gerard 1895
Major-Gen. P. Shveikovski 1895
Indian Intelligence Department.
Intelligence Department (W.O.).
Russian Intelligence Department.
SIGNIFICATIONS.
Ab water, river
Ak white
Bagha little
Bel, Bilis pass, gorge
Bulak well
Dara, Daria river
Darband gate
Dasht plain
Dawan pass
Gol, Kol stream
Gumbaz domed tomb
Ike great
Jilga stream
Kala fort
Kara black
Kizil red
Kok, Kuk mountain
Kotal pass
Kul lake
Kurghan fort, tower
Langar rest house
Mazar tomb
Murun river
Sari yellow
Sefed white
Tau mountain
Tepe hill
Ulan red
Usu, su river
Note.—The longitudes are referable to Madras Observatory taken as 80° 17′ 21″, to which a correction of −2′ 30″ must be applied to reduce to the most recent value, viz.: 80° 14′ 51″.
Kara-bel P.
Sar-Chol P.
Kash-sogun
Kiz-bulak
Karaul 3020
Katta-ailak 4000
Kosh-tograk
Kizil-su or Kashgar Daria
Kara-kuchar
Urdukluk
Yangiabad
Rabat Kupriak
Lung-ku
Yezabad 3900
Shapdali
Karan-kul
Yaman-yar
Urdum Padshak
Hazrat Begum (Shrine)
Saigun
Tuplik
Turuchet
Kizil 3910
Well & Mosque
Ak Rabat
Sharan-khan
Kok Rabat
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Kara-yantak
Karchun
Pogan
Chamasan
Aliusi
Yakshamba
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Khaja-arik
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Tashkurghan
Kala Wanj 6550
Kala Wamar 6530
Kala Bar Panja 6800
Kala Panja 9050
Zebak 8590
Darband
Khot
Rewak
Chazmod
Dasht
Sachart
Shaduj
Bunj
Yomuj
Di shahr
Pidrud
Peshnev
Tim
Wiar
Andar
Kazi Deh
Bar Shahr
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Yomul
Zu Dara
Sar i Sang
Yaghdara
Samcham
Pasha
Bashanabad
Tiragaran
Kolak
Sardab P.
Buzyirga
Surkh Dara
Kala Dira
Dasht Khan
Kedah
Dasht Tirabud
Flakmaurikh
Iskatol
Parch
Dehgul
Ayrum P. 16630
Agram
Senglich
Gazkistan
Unai P.
Mujgan
L. Dufferin 12450
Darah P. 14600
Kalish
Gabar
Emirdil
Shah Selim Digar
Mandak P.
Darbatd
Barzn
Zidig P.
Ahmad Dawaun (Shrine)
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Bayindra
Badamuk
Chabu
Purstrm
Sunru
Mungul
Panja
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Urnar
Agatsi
Khudesh 16120
Kamu
Patmol
Kasar Kuka
Gurdesh
Birkot
Arnu
Chitral R.
CHITRAL 4080
Joghur
Arjach
Chumor Kun
Rumbur
Bror
Bumboret
Gairat
Kasu
Sishi
Kala Drosh 4500
Gulatuk
Mirkhandi
Ashrethe
Lowari P. 10450
Gujar
Mirga
Panaikot
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Tirich Mir 24349
Khatinza P. 18360
Wanakand
Nisargal P. 16050
Tirich
Garuguch P. 17680
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Otseri
Shagram
Lasht
Kyan
Warkap
Stari
Capri
Pargo
Yarkhun R.
MASTUJ 7760
Buni
Mardal
Gilgar
Druinga
Lagh
Shugrom
Purpish
Budgar
Kol
Madasil
Barnas
Pret
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Maroi
Shamkhan
Gulen
Ahnu
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Banda i Gujar
Tal
Lamuti
Kalkot
Patrak
Panj kor
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Shandur P.
Shandur L.
Harchin
Langar
Rahman
Brok
Balim
Gasht
Barsat
Darband
Gramali
Gasht
Jait
Reshun
Madasil
Barnas
Pret
Parsan
Maroi
Gilgel R.
Laspur R.
Mastuj R.
Yarkhun R.
Tirich R.
Turikho R.
Lutkho R.
Yarkhun R.
Ghund Sharpan
Darasardin
Mujival
Wir
Rivak
Pirgeruan
Yeshil Kul
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Darakh dara R.
Issi-bulak
Bugrunal
Lenger P.
Tangshab R. (Gultar)
Yarakh
Akhun
Suchand
Suchan
Barsen
Bek murad
Tim
Sanan-buluk
Kirgh-izan
Darwaz
Rosh Kala
Koshlak
Jalu
Darkand
Kaori
Kokovata
Dram L.
Buhnekhta
Aksaya R.
Andervabad R.
Joshangaz bala
Karve-dangaz R.
Bazum R.
Budakh R.
Ab i Panja (Oxus)
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Shiva L.
Arokht
Darmarnakht
Sufu i mar
Koh Nakhpirpar
Kogiz Parin
Anderab R.
Hot Spring
Ruby Mines
Kala Sisz
Gharan Bala
Rich
Jual Dara
Zardev R.
Haiwan-kush P.
Dashi or Shura R.
Widaj
Raj
Zaj
Andar
Sarghilan R.
Kokcha or Kordaj R.
Khanak R.
Sardesh R.
Gogurdashi R.
Kabadmukh
Arkari
Morkhi
Purpuni
Laglasht
Shot
Shali
Golunda
Monigram
Hot Spring
Olas
Damul
Andarti
Shogot
Barkhot
Barjuxi
Kriji
Shali
Nagh
Ahnu
Shah Jan
Kargaum
Ruah
Bulasht
Sakuch
Parich
Bang
Amurut
Ujnu
Wasich
Miar
Khut P. 14800
Shulkat
Bujand
Sirjuri
Eskum
Dick
Istucki
Sarwat
Ishkashim
Turbat
Nandi
Han
Putur
Kala i Kafir
Kamigal
Langar
Shikarf
Rushan Khan
Warg 9880
Istragh
Sar Istragh 17450
Kavidek
Kashnak
Buzyirga
Sardab P.
Necham
Salad Dara
Tirich
Turikho
Warkhun
Misgar
Shergan
Zagwand
Kala Panja 9050
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Pahur
Zamak
Saor
Yenit
Pigash
Khanchut
Kichar
Shithar
Urgand
Digargand
Warup
Dersai
Darkhot
Lashkargaz
Bachalgaz
Garhi
Bujand
Shulkat
Sirjuri
Sarwat

RANGKUL PAMIR
Muskol Mts
18600
Rang Kul
12350
Shor Kul
Ak-gur
Plain
Baleuh P.
17780
Chanktah P.
Baz-baital R.
Jilga Kul
Kara-bulak P.
14460
Kara bulak
Sasik Kul
11800
Mt. Kok bilis
10850
Mt. Ishkar khan
11840
Chat tokai R.
Pshart P.
Pshart R.
11850
Murghab
12150
Marshab or Aksu R.
SAREZ PAMIR
Takhta bulak
Kara bilis R.
Kara dara
Hot Sulphur Springs
Aksu dalta
Marchenai R.
Marchenai
15700
Aqalkhar P.
Ruz tere
18920
Neza tash P.
13650
Shor-bulak P.
14700
Ak-bura R.
Ak-bura
Kurgak Istik
Istik R.
Sari-tash P.
Yangi dawan
Abdullah Khan Tomb
Chatir tash
13100
Alichur R.
Burzila
Bulun Kul
Gaz Kul
Sasik Kul
Tux Kul
Chakar Kul
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Gorumdi R.
Tash bala
Tetor sur P.
Issi bulak
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Bash Gumbaz P.
18460
Kumdi P.
L. Kara-dimer
Kok i terek P.
14200
Khargosh P.
14440
Chakar Kul
Kuramdu P.
Kojigut P.
Jarte Gumbaz
Burkanbar
Karasu
Kok bai P.
14400
Pamir R.
Suri Kul (Tor Kul)
13380
or Victoria L.
Karatungo L.
Andemin or Benderski P.
15130
Mazar tepe
13200
Mas P.
15120
Bohurak
Yol-mazur
12520
Mas R.
11530
Yuzkhana Jangalik
Suri Sar R.
Pamir R.
Chakmaktav Kul
13100
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18400
PAMIR-I-WAKHAN
Ab-i-Wakhan
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14700
Langar Kishi
Gazikhun
Abgarch
Wasil
Shipkat
Ab-i-Panj
Kuldarshid
Garan
Lupsuk
13000
Mts
Khanken P.
15600
Khanken Kuch
Rick or Janali P.
14200
Vichti P.
17350
Ziabeg
Topkhana
Tirbut
21691
Darkot P.
19200
Darkot
Darkot R.
Tarkhan R.
Darband
Guzan
Tai P.
14700
Camp
Jhapu
Warsum
Padun
Bang
Imit
Miragram
Yukum
Brep
Jinnna
Zemindan
Garhi
Chamarkand
Chashamber
Kashm
Shamaran
Shazarmal
Khajam
Shamashta
Langshah
Pandar L.
Aja
Parkalta
Ghizar
Tangai
Payal
Batresgak R.
Darkot
5150
Gurmalik
Khadim
Kiddche
Gullar
Inlas
Amulchat
Babari
Barkalti
Mir Wali
Manduri
Sandi
Gujalti
YASIN
7660
Dasan
Nu
Genda
Chalti
Shina
Hupar Pari
Ishkuman R.
Darkumal
Tirigarot
Gupis
Roshan
7060
Chashi P.
Pai P.
Dodargali P.
Khanbar P.
Chanchar P.
Kuranga
Mankial
Parbat
Palor
Kuni
Juglot
Yurg
Gaich
Samakial
Barigam P.
Harai
Kinjut P.
Paiot
Jugot
Shimrot
Chakerot
Damot
Zia
Bari Bas P.
Hodar
Totambat
Dandaloshi
Dusi
Bargin
Thalpen
Ke Gus
Kanu R.
Palassa P.
Jaba L.
Zakar
Mankial P.
Gabrial
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Karanga
Kalam
Aryanai
Beta
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Sumit R.
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Darkot R.
Tirich Mir
25426
Istor-o-Nal
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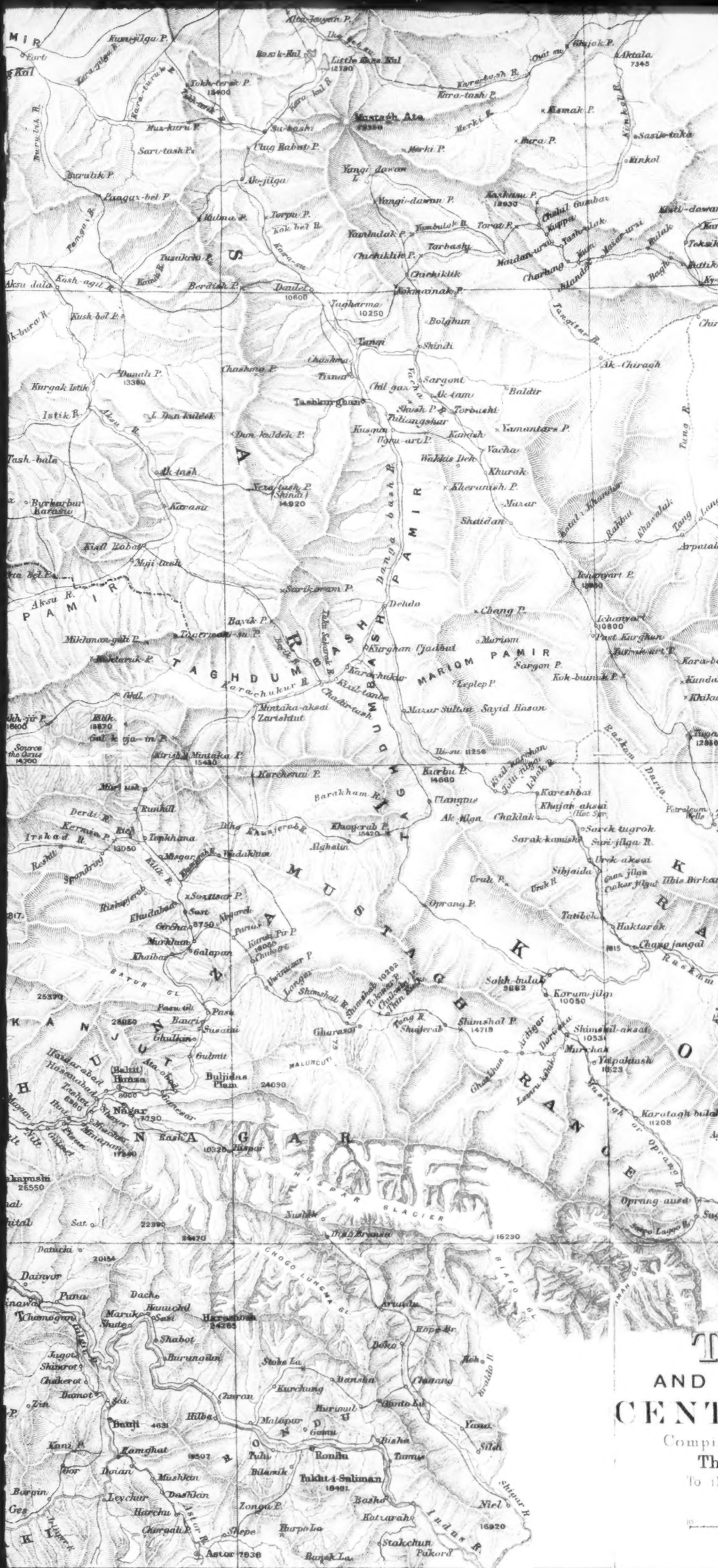
Saraghrar
24460
Koh-i-Hindu Kush
Koh-i-Hindu Kush
Koh-i-Hindu Kush


Mustagh Ata
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Little Kara Kul
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Kara-tash P.
Kara-tash R.
Aktala
7345
Kizmak P.
Kizmak R.
Sasik-taka
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Ulug Rabat P.
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Muz-kuru P.
Tokh-terek P.
12400
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12930
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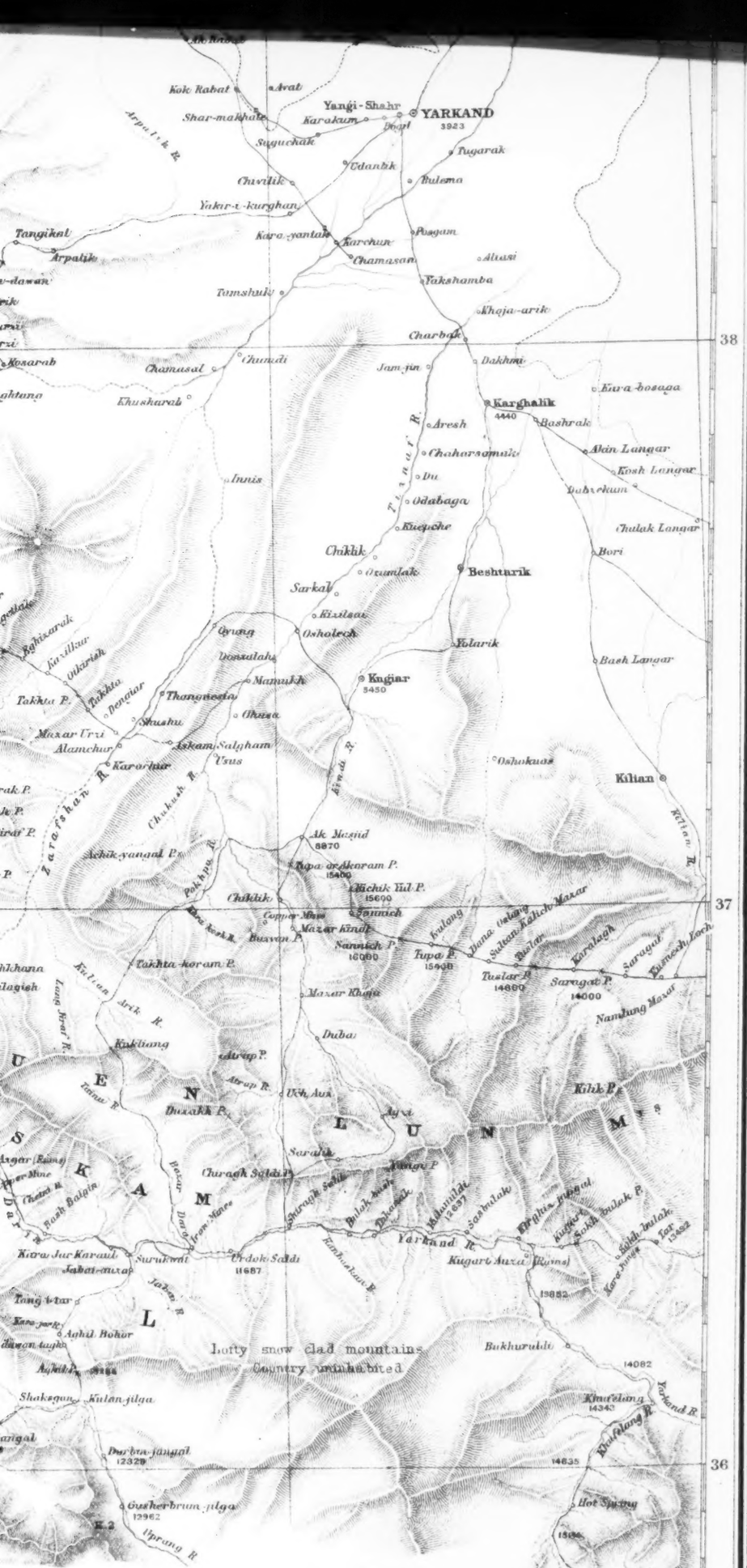
Tekes-kerik R.
Tekes-kerik-su
Tekes-kerik-su R.
Tekes-kerik-su P.
Tekes-kerik-su L.



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